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90-12**DEPARTMENT OF TRANSPORTATION****Federal Aviation Administration****14 CFR Parts 25, 121, and 135**

[Docket No. 26192, Notice No. 90-12]

RIN 2120-AD28

Improved Flammability Standards for Materials Used in the Interiors of Transport Category Airplane Cabins**AGENCY:** Federal Aviation Administration (FAA), DOT.**ACTION:** Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to clarify the recently adopted standards concerning the flammability of components used in the cabins of certain transport category airplanes. These clarifications would be applicable to air carriers, air taxi operators and commercial operators, as well as manufacturers of such airplanes.

DATES: Comments must be received on or before October 9, 1990.

ADDRESSES: Comments on this proposal may be mailed in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-10), Docket No. 26192, 800 Independence Avenue SW., Washington, DC 20591, or delivered in person to room 915G at the same address. Comments delivered must be marked: Docket No. 26192. Comments may be inspected in room 915G weekdays, except Federal holidays, between 8:30 a.m. and 5 p.m. In addition, the FAA is maintaining an information docket of comments in the Office of the Assistant Chief Counsel (ANM-7), FAA Northwest Mountain Region, 17900 Pacific Highway South, C-68966, Seattle, Washington 98168. Comments in the information docket may be inspected in the Office of the Assistant Chief Counsel weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Gary L. Killion, Manager, Regulations Branch, ANM-114, Transport Airplane Directorate, Aircraft Certification Service, FAA, 17900 Pacific Highway South, C-68966, Seattle, Washington 98168; telephone (206) 431-2112.

SUPPLEMENTARY INFORMATION:**Comments Invited**

Interested persons are invited to participate in the proposed rulemaking by submitting such written data, views, or arguments as they may desire. Commenters should identify the regulatory docket or notice number and submit comments, in duplicate, to the

Rules Docket address specified above. All comments will be considered by the Administrator before action on the proposed rulemaking is taken. The proposals contained in this notice may be changed in light of the comments received. All comments will be available in the Rules Docket, both before and after the closing date for comments, for examination by interested persons. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Commenters wishing the FAA to acknowledge receipt of their comments must submit with those comments a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. 26192." The postcard will be dated and time stamped and returned to the commenter.

Availability of NPRM

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Public Affairs, Attention: Public Information Center, APA-430, 800 Independence Avenue SW., Washington, DC 20591; or calling (202) 267-3484. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future NPRM's should also request a copy of Advisory Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedures.

Background

Notice of Proposed Rulemaking (NPRM) No. 85-10 which was published in the *Federal Register* on April 18, 1985 (50 FR 15038) and ultimately led to Amendments 25-61 and 121-189, proposed to upgrade the flammability standards for materials used in the interiors of transport category airplanes.

As discussed in the notice, the proposed standards were developed following a research and development program managed and conducted primarily at the FAA Technical Center in Atlantic City, New Jersey, to study aircraft fire characteristics and develop practical test methods.

Among the tests conducted at the Technical Center were full-scale fire tests using the fuselage of a military C-133 configured to represent a wide-body jet transport airplane. The test conditions simulated representative post-crash external fuel-fed fires. Numerous laboratory tests were also conducted to correlate possible material qualification test methods with the full-scale tests. As a result of those tests, the Ohio State University (OSU) radiant

rate-of-heat-release apparatus was determined to be the most suitable for material qualification. The acceptance criteria proposed in Notice 85-10 were chosen in order to produce a significant retardation of the flashover event which controls occupant survivability, as experienced in the full-scale testing. Commenters responding to Notice No. 85-10 contended that the progress of the rulemaking initiative was, in general, outpacing developments in materials technology. Nevertheless, the FAA did not consider the comments received by that time sufficient to warrant abandoning the rulemaking or delaying it further, considering the increases in fire safety that would be achieved. Amendments 25-61 and 121-189 were adopted accordingly (51 FR 26208; July 21, 1986); however, the FAA did request further comments on both the test procedure and the appropriateness of the performance criteria.

Amendment 25-61 established flammability standards for transport category airplanes with passenger seating capacities of 20 or more and specified the test method and apparatus to be used in showing compliance with those standards. It specified that interior ceiling and wall panels (other than lighting lenses), partitions, and the outer surfaces of galleys, large cabinets and stowage compartments (other than underseat stowage compartments and compartments for stowing small items such as magazines and maps) must meet the new standards. As outlined in the amendment, an average of three or more test specimens must not exceed 65 kilowatts per square meter peak heat release nor 65 kilowatt minutes per square meter total heat release during the first two minutes of sample exposure time (65/65) when tested using the OSU test apparatus.

Because Amendment 25-61 directly applies only to airplanes for which an application for type certificates is made after August 20, 1986, Amendment 121-189 was also adopted to require certain other airplanes used in air carrier or air taxi service to meet the new 65/65 standards. Those airplanes must meet the new standard if they are newly manufactured on or after August 20, 1990. Airplanes type certificated on or after January 1, 1958, and manufactured prior to August 20, 1990, must also comply with the new standards upon the first substantially complete replacement of the specified cabin interior components on or after the latter date.

At the time the amendments were adopted, the FAA understood that some persons were planning to install components which, even though they

would meet the previously existing requirements of part 25 for flammability, were more flammable than the components which were in general use at that time. In order to preclude a possible degradation in the flammability characteristics of the cabin interiors, Amendment 121-189 also established interim standards of 100 kilowatts per square meter peak heat release and 100 kilowatt minutes per square meter total heat release (100/100). The interim standards are applicable to airplanes manufactured during the two-year period prior to August 20, 1990; and, unless there is a substantially complete replacement of the specified cabin interior components on or after August 20, 1990, they will remain applicable to those airplanes as long as they are used in air carrier or air taxi service. (If there is a substantially complete replacement on or after that date, the definitive 65/65 standards would be applicable.) In addition, the interim standards are also applicable to airplanes in which there is a substantially complete replacement of the specified interior components during that two-year period.

Prior to the adoption of Amendment 121-189, § 25.853(a-1) required certain airplanes to meet earlier flammability standards upon the first substantially complete replacement of the cabin interior. (Note that this earlier rulemaking refers to a substantially complete replacement of all cabin interior components, while the later rulemaking refers to a substantially complete replacement of the specified interior components. Whether certain other interior components, e.g., seat cushions and flooring, are replaced is not relevant to whether there is a substantially complete replacement in the latter case.) This earlier requirement is partially superseded if there is a substantially complete replacement of the interior components specified in § 25.853(a-1) on or after August 20, 1988. It does remain applicable, however, insofar as interior components not specified in § 25.853(a-1) are concerned. It also remains applicable to airplanes in which there has not been a substantially complete replacement of the cabin interior on or after August 20, 1988, even though that date has passed.

As noted above, further comments were requested in the preamble to Amendments 25-61 and 121-189. In the meantime, the Aerospace Industries Association of America (AIA) and Air Transport Association of America (ATA) jointly petitioned for further rulemaking that would substitute different test procedures and acceptance criteria. Their petition was published in

the *Federal Register* on July 21, 1986 (51 FR 26166) along with a request for public comments thereon. In essence, the petitioners proposed adopting the interim standards of 100/100 as the definitive standards and adding a test for smoke emissions. Due to their interrelationship, comments received in regard to the AIA/ATA petition were considered along with those requested in the preamble to Amendments 25-61 and 121-189.

In consideration of these additional comments, Amendments 25-66 and 121-198 were also adopted (53 FR 37542; September 27, 1988). Those amendments involve minor refinements in the test procedures and apparatus required to show compliance with the standards adopted by Amendment 25-61 and a provision that would allow deviations to be granted under special circumstances for those few components for which timely compliance cannot be achieved. In view of the comments received and the degradation of safety that would result, the FAA did not relax the flammability standards. An additional requirement for smoke testing was, however, adopted.

Discussion

Since the time Amendments 25-61 and 121-189 were adopted, the FAA has become aware of four areas in which the wording of the new rules does not clearly reflect the intent of the agency as discussed in the preambles to Notice No. 85-10 and those amendments. Because the new rules do not clearly reflect the intent in those areas and because the comments that were received may have been based on the intent, as expressed in the preambles, rather than the literal wording of the rules, the clarifications proposed in this notice are considered necessary.

Cabin Windows and Clear Vision Panels in Cabin Partitions

It was noted in the preamble to Notice No. 85-10 that windows would not be required to meet the new flammability standards. Further elaboration on this subject was given in the preamble to Amendments 25-61 and 121-189 which states, "The new flammability standards do not apply to transparent or translucent components such as lenses used in interior lights and illuminated signs, and window anti-scratch panels, because of the lack of materials which will meet the flammability standards and still have the light transmissibility characteristics which are vital in emergency situations." Although not specifically mentioned in the preamble, transparent panels are sometimes inserted in cabin partitions to enhance

cabin safety. For example, they are sometimes used to provide seated flight attendants a clear, unobstructed view of the cabin or to provide passengers a view of an exit as an aid to an emergency evacuation. As in the case of lighting lenses and windows, the need for transparent partition panels which enhance cabin safety outweighs the increased safety provided by components that meet the new flammability standards considering the small area such transparencies would involve. In order to preclude confusion concerning the applicability of the standards to such transparent or translucent panels, the first parenthetical phrase in § 25.853(a-1) would be amended to read, "other than lighting lenses and windows," and an additional phrase, "other than transparent panels needed to enhance cabin safety," would be inserted in that section following the word "partitions." The maximum size of a transparent panel would, of course, be limited to that which is actually needed to enhance cabin safety.

Should materials capable of meeting the new flammability standards and having the necessary light transmissibility characteristics for use as windows, etc., be developed later, the FAA would consider further rulemaking to require those components to meet the new flammability standards also.

Galleys

As currently worded, § 25.853(a-1) states that new flammability standards apply to the "outer surfaces of galleys." This phrase was intended to make an exception for the interior surfaces of galley cabinets, etc., which would not be exposed to a cabin fire. It is ambiguous, however, because most galleys are not isolated from the main cabin by a door. While one might consider the surfaces of a galley working area to be "inner surfaces," they are actually outer surfaces in the sense that they could be exposed to a cabin fire. In addition, the inner walls of the galley cart cavity or standard container cavity may also be exposed on some lightly loaded flights when there is not a full complement of carts or containers on board. In order to preclude any confusion in this regard, § 25.853(a-1) would be amended to clarify that any galley surface exposed to the passenger cabin must meet the new standards.

Isolated Compartments

Unlike previously existing paragraphs (a) and (b) of § 25.853, the new flammability standards of paragraph (a-1) were intended to apply only to the

passenger cabin and not to compartments that are isolated from the passenger cabin. Due, however, to the organization of § 25.853(a-1), if taken literally, the new standards also pertain to each compartment occupied by crew (including one occupied only on a temporary basis) or passengers regardless of whether the particular compartment is isolated from the passenger cabin.

Neither the research and development program nor the regulatory evaluations on which the new flammability standards were based considered that compartments isolated from the passenger cabin (or cabins in the case of airplanes with passenger cabins located on two different decks) would have to comply with the new standards. Unlike most galleys located in the main cabin, remote galleys and other compartments, such as lavatories, pilot compartments and crew rest or sleeping areas, are generally isolated from the passenger cabin by at least a door. In some instances, they are located on separate decks. They would, therefore, not be exposed to a cabin fire until well after flashover had occurred in the cabin and egress was no longer possible. Should an external fire enter the airplane at one of those compartments, the flammability of the materials used in them would not directly affect the cabin due to their isolation. As stated in the preamble to Notice No. 85-10, the new standards address a postcrash, external fuel-fed fire situation. With the exception of the pilot compartment, it can be assumed that such compartments would not be occupied by passengers or crewmembers during a postcrash situation.

Although the rulemaking was undertaken to address a post-crash scenario, there is also the question of whether or not requiring the lavatories to meet the new flammability standards would enhance safety significantly in the event a fire originated in a lavatory during flight. This question is particularly pertinent in light of the recently adopted ban on smoking on certain domestic airline flights. Although some persons might be more tempted to smoke illicitly in a lavatory during such flights, the lavatory smoke detector required by recently adopted Amendment 121-185 (50 FR 12726; March 29, 1985) serves as a deterrent and provides warning of illicit smoking to the crew. In addition, the new standards do not apply to many of the components in a lavatory due to their small size. The sidewalls and doors have to meet the new standards regardless of whether the new standards

are applicable to lavatories because their outer sides also form surfaces of the passenger cabin. Some portions of the lavatory are generally constructed of fireproof stainless steel due to functional considerations. Requiring the few remaining large components to meet the new standards would have very little impact on the overall flammability of the lavatory and would not significantly enhance safety in the event of an inflight fire.

Pilot compartments are generally isolated from the passenger cabin by a bulkhead and door. Although they are obviously occupied full-time, requiring them to meet the new standards would not significantly enhance safety in the event of an inflight fire for essentially the same reasons. Pilot compartments are generally constructed of many small components which would not have to meet the new standards due to their small size. The bulkhead and entry door have to meet the new standards regardless of whether they are applicable to the pilot compartment because the aft sides of those components also form surfaces of the passenger cabin. As in the case of the lavatories, requiring the few remaining large components to meet the new standards would have very little impact on the overall flammability of the pilot compartment. Although there is no smoke detector required, a fire would be detected immediately by the flight crewmembers. In addition, at least one hand fire extinguisher must be conveniently located in the pilot compartment in accordance with § 25.851(a)(6).

In view of these considerations, § 25.853 would be amended to clarify that compartments that are isolated from the cabin need not meet the new standards. Sidewalls, doors, etc., which separate such compartments from the passenger cabin must, of course, meet the new standards because they also form part of the passenger cabin.

Galley Carts and Other Rotatable Galley Equipment

The preamble to Notice No. 85-10 contains the statement, "Service items, such as pillows or blankets, magazines, food, and alcoholic beverages, are not part of the certification process and would not have to meet the new flammability standards." Galley carts are considered to be service items; however, unlike the items cited in the preamble statement, they are generally approved as part of the airplane type design. Although the new flammability standards do not apply expressly to galley carts, it was intended that they would apply implicitly to the extent that,

when stowed, the galley carts form exterior surfaces of the galley. Typically, at least one end of each cart remains exposed and forms a galley surface while the cart is stowed. In addition to galley carts, there are galley standard containers used for various meal courses, beverages, plates, etc., which also form galley surfaces when stowed.

Operators have pointed out that galley carts are removable items that are rotated from one airplane to another with each flight. In this regard, they note that their fleets will include older airplanes that are not required to meet the new standards, as well as new airplanes (or airplanes in which the interiors have been replaced) that will be required to meet the new standards. They further note that the carts are loaded before a flight by persons, usually independent caterers, who have no way of knowing whether or not the airplane that will be used on the flight is required to meet the new standards. Unless all existing noncomplying galley carts are replaced with galley carts that meet the new standards, there is no practical means to ensure that galley carts meeting the new standards will be loaded on the airplanes that are required to meet them. It is estimated that there are now approximately 125,000 galley carts in use with the U.S. air carrier fleet. Typically, the cost per cart ranges from \$800 to \$3,500; and the service life is about eight to ten years. While it is feasible to replace the existing carts on an attrition basis, it would be impractical to produce enough galley carts meeting the new standards in time to meet the established deadlines. In addition, such immediate replacement would be very costly. The operators note that they would have commented in response to Notice No. 85-10 accordingly had they not believed that, as service items, galley carts did not have to meet the new standards.

The galley standard containers are also rotated from airplane to airplane; and they, too, are filled prior to the flight by persons who have no way of knowing whether the airplane which will be used on the flight is one required to meet the new standards. While the cost of each galley standard container would be less than that of a beverage cart, replacing the entire inventory of containers would be very costly.

Although it was intended that the exposed surfaces of stowed galley carts and standard containers should meet the new standards, the FAA has concluded, upon further review, that the NPRM did not state clearly that the galley carts and containers would be required to comply. The FAA considers

that the exposed surfaces of stowed galley carts and standard containers must ultimately meet the new flammability standards. Section 25.853(a-1) would, therefore, be amended to specifically require that the exposed surfaces of those components meet the new standards.

The FAA concurs that the immediate replacement of all of galley carts and standard containers would be logistically impossible and would present an unreasonable economic burden. Unless all carts and containers are replaced, however, it would be extremely difficult to ensure that galley carts and standard containers meeting the new standards are loaded on the airplanes that are required to meet them. If galley carts and standard containers that meet the new standards are acquired at a rate commensurate with the rate at which new airplanes are acquired (and interiors of older airplanes are replaced), it can be assumed that the overall level of safety of the air carrier fleet will not be adversely affected by intermixing carts and containers complying with the new standards with those that do not. The small decrement of safety that would be suffered due to the use of noncomplying carts and containers in an airplane that is required to meet the new standards would be compensated by an increment of safety enjoyed due to the use of complying carts and containers in another airplane that is not required to meet them. Section 121.312 would, therefore, be amended to allow such intermixing of galley carts and standard containers, provided that all carts and containers manufactured after a specified date meet the new standards.

Other Changes

Certain minor refinements in the test apparatus and procedures have been identified; and appendix F of part 25, including the associated figures, would be revised accordingly. These refinements would not preclude the use of materials previously found to be acceptable under the new standards; nor enable the use of materials previously found unacceptable; however, they would improve the repeatability of test results from one test run to another and from one laboratory to another. Other minor nonsubstantive editorial changes would be made for consistency in style. Nonsubstantive editorial changes would also be made to § 25.853 for clarity.

The organization and language of § 121.312(a) would be revised for clarity.

Part 135 was not amended at the time the new standards were adopted; however, they are equally applicable to part 135 operators, because § 135.169(a)

incorporates the provisions of part 121 by reference. Since that time, it has come to the attention of the FAA that the practice of incorporating certain provisions of part 121 in part 135 by reference may cause confusion. In order to preclude any confusion in this regard, part 135 would be amended to include the new standards explicitly rather than by reference. Because part 135 operators are already required to meet these standards due to the incorporation by reference, this change would not place any additional burden on any person.

The reference to "November 26, 1987" § 121.312(b) is no longer relevant because that date has already passed. It would, therefore, be removed for clarity. The redundant reference to appendix F would also be removed for clarity and consistency with the editorial style used in § 121.312(a). (Appendix F, part II, is incorporated by reference in § 25.853(c); and appendix F, part IV, is incorporated by reference in § 25.853(a-1).)

Regulatory Evaluation

The proposed amendment to part 135 is merely a non-substantive editorial change which would cause no additional burden on any person. The proposed changes to the test apparatus and procedures are merely refinements which would result only in negligible costs and benefits. The remaining proposed amendments would clarify and correct parts 25 and 121 to reflect the intent of the earlier amendments. The regulatory evaluation prepared previously for Amendments 25-66 and 121-198 remains unchanged with respect to costs and benefits, regulatory flexibility, and international trade.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily and disproportionately burdened by government regulations. The Act requires agencies to review rules which may have "a significant economic impact on a substantial number of small entities." Since the Act applies to U.S. entities, only U.S. manufacturers and operators of transport category airplanes would be affected.

In the United States, there are two manufacturers that specialize in commercial transport category airplanes, The Boeing Company and McDonnell Douglas Corporation. In addition, there are a number of others that specialize in the manufacture of other transport category airplanes, such as those designed for executive transportation. These are Cessna Aircraft Corporation, Beech Aircraft

Corporation, Gulfstream American Corporation and Gates Learjet Corporation.

The FAA size threshold for a determination of a small entity for U.S. airplane manufacturers is 75 employees; any manufacturer with more than 75 employees is considered not to be a small entity. Because none of the U.S. manufacturers of transport category airplanes is a small entity, this proposed rule would have no impact on any manufacturer that is a "small entity."

The FAA size threshold for determination of a small entity for airplane operators is nine owned airplanes or fewer; that is, any operator with more than nine is considered not to be a small entity. The cost thresholds for determination of a significant impact are \$91,500, \$51,200 and \$3,600 for scheduled air carriers with all airplanes having more than 60 seats, other scheduled air carriers, and unscheduled air carriers, respectively. The costs associated with this proposed rule are negligible; therefore, it would have a significant economic impact on any operator that is a "small entity."

Because this proposed rule would not have a "significant economic impact on a substantial number of small entities," no review is required in this regard by the Act.

International Trade Impact Assessment

This proposal is not expected to have an adverse impact either on the trade opportunities of U.S. manufacturers of transport category airplanes doing business abroad or on foreign aircraft manufacturers doing business in the U.S. Since the certification rules are applicable to both foreign and domestic manufacturers selling airplanes in the U.S., there would be no competitive trade advantage to either.

Federalism Implications

The regulations proposed herein would not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

Because the regulations proposed herein are expected to result only in negligible costs, the FAA has determined that this proposed rule is not major as defined in Executive Order

12291. Because this is an issue that has not prompted a great deal of public concern, this proposed rule is not considered to be significant as defined in Department of Transportation Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). In addition, since there are no small entities affected by this rulemaking, it is certified, under the criteria of the Regulatory Flexibility Act, that this proposed rule, at promulgation, would not have a significant economic impact, positive or negative, on a substantial number of small entities. The regulatory evaluation prepared for Amendments 25-66 and 121-198 remains applicable and has been placed in the docket. A copy of this evaluation may be obtained by contacting the person identified under the caption "FOR FURTHER INFORMATION CONTACT."

List of Subjects

14 CFR Part 25

Air transportation, Aircraft, Aviation safety, Safety.

14 CFR Part 121

Aviation safety, Safety, Air carriers, Air transportation, Aircraft, Airplanes, Flammable materials, Transportation, Common carriers.

14 CFR Part 135

Aviation safety, Safety, Air carriers, Air transportation, Aircraft, Airplanes, Cargo, Hazardous baggage, Materials, Transportation, Mail.

The Proposed Amendments

Accordingly, the FAA proposes to amend the Federal Aviation Regulations (FAR) 14 CFR parts 25, 121, and 135 as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. The authority citation for part 25 continues to read as follows:

Authority: 49 U.S.C. 1344, 1354(a), 1355, 1421, 1423, 1424, 1425, 1428, 1429, 1430; 49 U.S.C. 106(g) (Rev. Pub. L. 97-449, January 12, 1983).

2. By amending § 25.853 by revising the introductory language and paragraphs (a) and (a-1), and by adding a new paragraph (a-2), to read as follows:

§ 25.853 Compartment interiors.

Except as provided in paragraphs (a-1) and (a-2) of this section, materials (including finishes or decorative surfaces applied to the materials) used in each compartment occupied by the

crew or passengers must meet the following test criteria as applicable:

(a) Interior ceiling panels, interior wall panels, partitions, galley structure, large cabinet walls, structural flooring, and materials used in the construction of stowage compartments (other than underseat stowage compartments for stowing small items such as magazines and maps) must be self-extinguishing when tested vertically in accordance with the applicable portions of part I of appendix F of this part or other equivalent methods. The average burn length may not exceed 6 inches and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than an average of 3 seconds after falling.

(a-1) For airplanes with passenger capacities of 20 or more, the following interior components must also meet the test requirements of parts IV and V of appendix F of this part, or other approved equivalent method, in addition to the flammability requirements prescribed in paragraph (a) of this section:

- (1) Interior ceiling and wall panels, other than lighting lenses and windows;
- (2) Partitions, other than transparent panels needed to enhance cabin safety;
- (3) Galleys, including exposed surfaces of stowed carts and standard containers and the cavity walls that are exposed when a full complement of such carts or containers is not carried; and
- (4) Large cabinets and cabin stowage compartments, other than underseat stowage compartments and compartments for storing small items such as magazines and maps.

(a-2) The interiors of compartments, such as pilot compartments, galleys, crew rest quarters, cabinets and stowage compartments, need not meet the standards of paragraph (a-1), provided the interiors of such compartments are isolated from the main passenger cabin by doors or equivalent means that would normally be closed during an emergency landing condition.

3. By amending part IV of appendix F to part 25 by revising paragraphs (b) (1) through (6) and flush paragraphs (b)(8), (c)(1), (d)(3), (e)(1) through (5), (f)(2) to read as follows, and by replacing Figure 1 with new Figures 1A and 1B as follows:

Appendix F

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Part IV—Test Method to Determine the Heat Release Rate from Cabin Materials Exposed to Radiant Heat

* * * * *

(b) * * *

(1) This apparatus is shown in Figures 1A and 1B. All exterior surfaces of the apparatus, except the holding chamber, must be insulated with 25 mm thick, low density, high temperature, fiberglass board insulation. A gasketed door through which the sample injection rod slides must be used to form an airtight closure on the specimen hold chamber.

(2) *Thermopile.* The temperature difference between the air entering the environmental chamber and that leaving must be monitored by a thermopile having five hot and five cold, 24-gauge Chromel-Alumel junctions. The hot junctions must be spaced across the top of the exhaust stack, 10 mm below the top of the chimney. The thermocouples must have a .040 to .060 diameter, ball-type, welded tip. One thermocouple must be located in the geometric center, with the other four located 30 mm from the center along the diagonal toward each of the corners (Figure 5). The cold junctions must be located in the pan below the lower air distribution plate (see paragraph (b)(4)). Thermopile hot junctions must be cleared of soot deposits as needed to maintain the calibrated sensitivity.

(3) *Radiation Source.* A radiant heat source for generating a flux up to 100 kW/m², using four silicone carbide elements, Type LL, 20 inches (51 cm) long by 3/8 inch (1.6 cm) O.D., nominal resistance of 1.4 ohms, is shown in Figures 2A and 2B. The silicone carbide elements must be inserted in the stainless steel panel box by inserting them through 15.9 mm holes in 0.8 mm thick ceramic fiber board. Locations of the holes in the pads and stainless steel cover plates are shown in Figure 2B. The diamond-shaped mask of .042 ± .002 stainless steel must be added to provide uniform heat flux over the area occupied by the 150-by-150-mm vertical sample.

(4) *Air Distribution System.* The air entering the environmental chamber must be distributed by a 6.3 mm thick aluminum plate having eight, No. 4 drill holes, 51 mm from sides on 102 mm centers, mounted at the base of the environmental chamber. A second plate of 18 gauge stainless steel having 120, evenly spaced, No. 28 drill holes must be mounted 150 mm above the aluminum plate. A well-regulated air supply is required. The air supply manifold at the base of the pyramidal section must have 48, evenly spaced, No. 26 drill holes located 10 mm from the inner edge of the manifold, resulting in an airflow split of approximately three to one within the apparatus.

(5) *Exhaust Stack.* An exhaust stack, 133-mm by 70-mm in cross section, and 254-mm long, fabricated from 28 gauge stainless steel must be mounted on the outlet of the pyramidal section. A 25-mm by 76-mm plate of 31 gauge stainless steel must be centered inside the stack, perpendicular to the air flow, 75-mm above the base of the stack.

(6) *Specimen Holders.* The 150-mm by 150-mm specimen must be tested in a vertical orientation. The holder (Figure 3) must be

provided with a specimen holder frame, which touches the specimen (which is wrapped with aluminum foil as required by paragraph (d)(3) of this part) along only the 6-mm perimeter, and a "V" shaped spring used to hold the assembly together. A detachable 12-mm by 12-mm by 150-mm drip pan and two .020-inch stainless steel wires (as shown in Figure 3) must be used for testing materials prone to melting and dripping. The positioning of the spring and frame may be changed to accommodate different specimen thicknesses by inserting the retaining rod in different holes on the specimen holder.

Since the radiation shield described in ASTM E-906 is not used, a guide pin must be added to the injection mechanism. This fits into a slotted metal plate on the injection mechanism outside of the holding chamber, and it can be used to provide accurate positioning of the specimen face after injection. The front surface of the specimen must be 100-mm from the closed radiation doors after injection.

The specimen holder clips onto the mounted bracket (Figure 3). The mounting bracket must be attached to the injection rod by three screws that pass through a wide-area washer welded onto a 1/2-inch nut. The end of the injection rod must be threaded to screw into the nut, and a .020-inch thick wide area washer must be held between two 1/2-inch nuts that are adjusted to tightly cover the hole in the radiation doors through which the injection rod or calibration calorimeter pass.

(8) *Pilot-Flame Positions.* Pilot ignition of the specimen must be accomplished by simultaneously exposing the specimen to a lower pilot burner and an upper pilot burner, as described in paragraphs (b)(8)(i) and (b)(8)(ii), respectively. The pilot burners must remain lighted for the entire 5-minute duration of the test. Intermittent pilot flame extinguishment for greater than 3 seconds invalidates the test results.

(i) *Lower Pilot Burner.* The pilot-flame tubing must be 6.3 mm O.D., 0.8 mm wall, stainless steel tubing. A mixture of 120 cm³/min. of methane and 850 cm³/min. of air must be fed to the lower pilot flame burner. The normal position of the end of the pilot burner tubing is 10 mm from and perpendicular to the exposed vertical surface of the specimen. The centerline at the outlet of the burner tubing must intersect the vertical centerline of the sample at a point 5 mm above the lower exposed edge of the specimen.

(ii) *Upper Pilot Burner.* The pilot burner must be a straight length of 6.3 mm O.D., 0.8 mm wall, stainless steel tubing that is 360 mm long. One end of the tubing must be closed,

and three No. 40 drill holes must be drilled into the tubing, 60 mm apart, for gas ports, all radiating in the same direction. The first hole must be 5 mm from the closed end of the tubing. The tube must be positioned 20 mm above and 20 mm behind the exposed upper edge of the specimen. The middle hole must be in the vertical plane perpendicular to the exposed surface of the specimen which passes through its vertical centerline and must be pointed toward the radiation source. The gas supplied to the burner must be methane adjusted to produce flame lengths of 25 mm.

(c) * * *

(1) *Heat Release Rate.* A burner, as shown in Figure 4, must be placed over the end of the lower pilot flame tubing using a gas tight connection. The flow of gas to the pilot flame must be at least 99 percent methane and must be accurately metered. Prior to usage, the wet test meter must be properly leveled and filled with distilled water to the tip of the internal pointer while no gas is flowing. Ambient temperature and pressure of the water are based on the internal wet test meter temperature. A baseline flow rate of approximately 1 liter/min. must be set and increased to higher preset flows of 4, 6, 8, 6 and 4 liters/min. Immediately prior to recording methane flow rates, a flow rate of 8 liters/min. must be used for 2 minutes to precondition the chamber. This is not recorded as part of calibration. The rate must be determined by using a stopwatch to time a complete revolution of the wet test meter for both the baseline and higher flow, with the flow returned to baseline before changing to the next higher flow. The thermopile baseline voltage must be measured. The gas flow to the burner must be increased to the higher preset flow and allowed to burn for 2.0 minutes, and the thermopile voltage must be measured. The sequence must be repeated until all five values have been determined. The average of the five values must be used as the calibration factor. The procedure must be repeated if the percent relative standard deviation is greater than 5 percent. Calculations are shown in paragraph (f).

* * * * *

(d) * * *

(3) *Mounting.* A single layer of 0.025-mm aluminum foil must be wrapped tightly on all sides of the specimen except for the one surface that is exposed during the test.

(e) * * *

(1) The power supply to the radiant panel must be set to produce a radiant flux of 3.5 W/cm². The flux must be measured at the point the center of the specimen surface will occupy when positioned for the test. The

radiant flux must be measured after the air flow through the equipment is adjusted to the desired rate. The sample must be tested in its end use thickness.

(2) After the pilot flames are lighted, their position must be checked as described in paragraph (b)(8).

(3) Air flow through the apparatus must be controlled by a circular plate orifice located in a 1.5 inch I.D. pipe with two pressure measuring points, located 1.5 inches upstream and .75 inches downstream of the orifice plate, connected to a manometer set at a pressure differential of 200 mm of Hg. (See Figure 1B.) The total air flow to the equipment is approximately .04 m³/seconds. The stop on the vertical specimen holder rod must be adjusted so that the exposed surface of the specimen is positioned 100 mm from the entrance when injected into the environmental chamber.

(4) The specimen must be placed in the hold chamber with the radiation doors closed. The airtight outer door must be secured, and the recording devices must be started. The specimen must be retained in the hold chamber for 60 seconds, plus or minus 10 seconds, before injection. The thermopile "zero" value must be determined during the last 20 seconds of the hold period.

(5) When the specimen is to be injected, the radiation doors must be opened. After the specimen is injected into the environmental chamber, the radiation doors must be closed behind the specimen.

* * * * *

(f) * * *

(2) Heat release rates may be calculated from the reading of the thermopile output voltage at any instant of time as:

$$\text{HRR} = \frac{(V_m - V_b) K_h}{.02323 \text{m}^2}$$

HRR = heat release rate (kw/m²)

V_b = baseline voltage (mv)

V_m = measured thermopile voltage (mv)

K_h = calibration factor (kw/mv)

* * * * *

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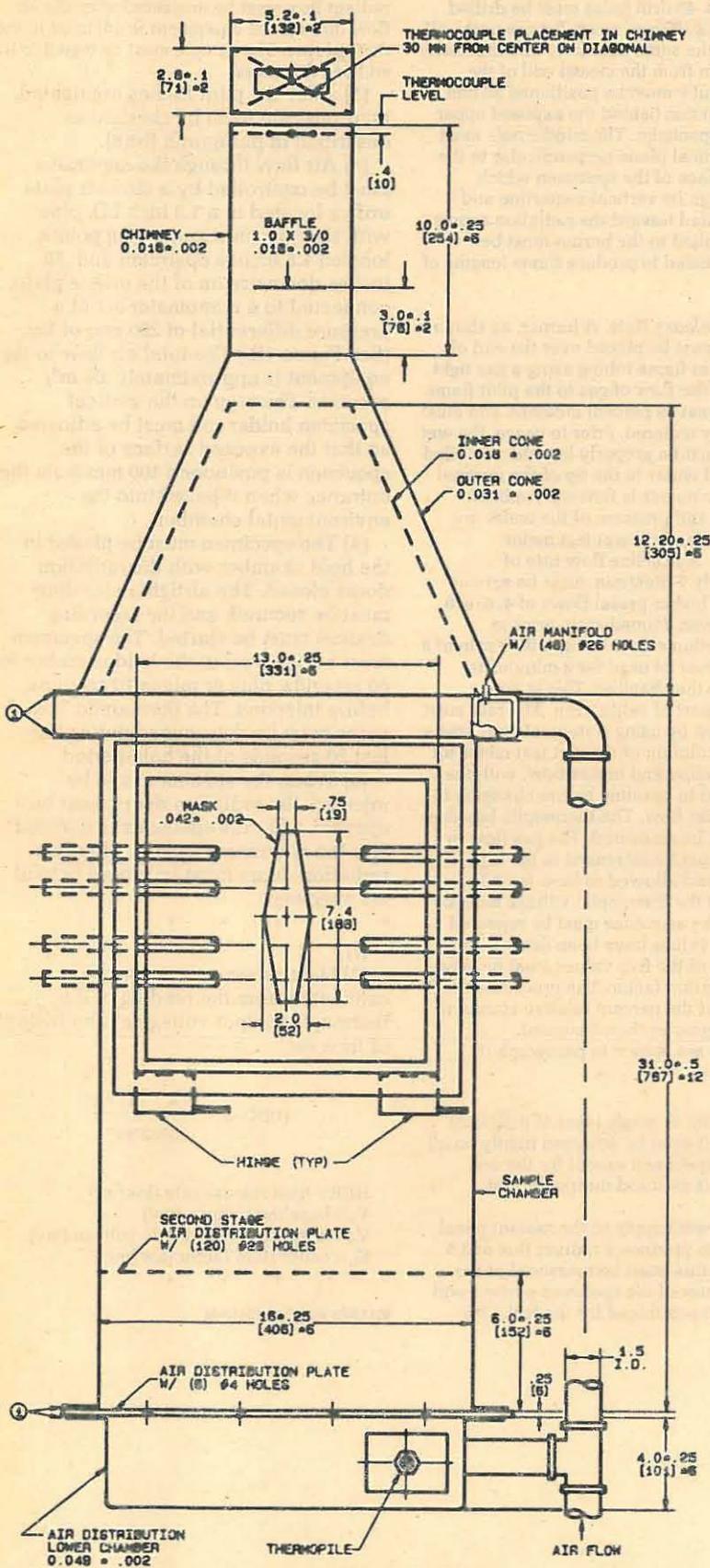
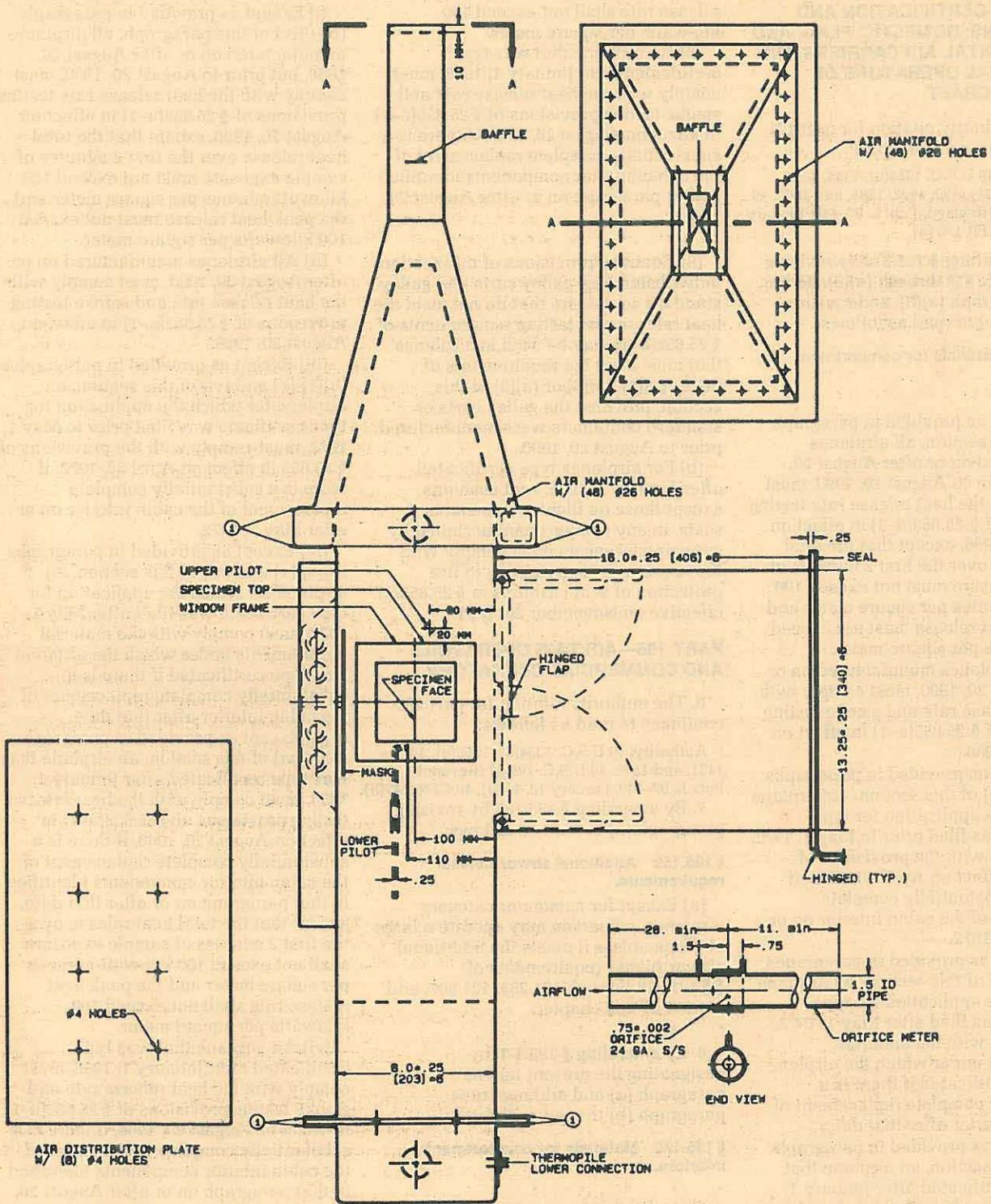


Figure 1A



NOTE

① SEAL AND SECURE (BOLTS, CLAMPS)

Figure 1B

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

4. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 1354(a), 1355, 1356, 1357, 1401, 1421-1430, 1472, 1485, and 1502; 49 U.S.C. 106(g) (Revised, Pub. L. 97-449, January 12, 1983); 49 CFR 1.47(a).

5. By amending § 121.312 by revising paragraphs (a)(1) through (a)(6), adding a new paragraph (a)(8), and revising paragraph (b) to read as follows:

§ 121.312 Materials for compartment interiors.

(a) * * *

(1) Except as provided in paragraph (a)(6) of this section, all airplanes manufactured on or after August 20, 1988, but prior to August 20, 1990, must comply with the heat release rate testing provisions of § 25.853(a-1) in effect on August 20, 1986, except that the total heat release over the first 2 minutes of sample exposure must not exceed 100 kilowatt minutes per square meter and the peak heat release must not exceed 100 kilowatts per square meter.

(2) All airplanes manufactured on or after August 20, 1990, must comply with the heat release rate and smoke testing provisions of § 25.853(a-1) in effect on August 20, 1986.

(3) Except as provided in paragraphs (a) (5) and (6) of this section, an airplane for which the application for type certificate was filed prior to May 1, 1972, must comply with the provisions of § 25.853 in effect on April 30, 1972, if there is a substantially complete replacement of the cabin interior on or after May 1, 1972.

(4) Except as provided in paragraphs (a)(5) and (6) of this section, an airplane for which the application for type certificate was filed after May 1, 1972, must comply with the material requirements under which the airplane was type certificated if there is a substantially complete replacement of the cabin interior after that date.

(5) Except as provided in paragraph (a)(6) of this section, an airplane that was type certificated after January 1, 1958, must comply with the heat release testing provisions of § 25.853(a-1) in effect on August 20, 1986, if there is a substantially complete placement of the cabin interior components identified in that paragraph on or after that date, except that the total heat release over the first 2 minutes of sample exposure shall not exceed 100 kilowatt-minutes per square meter and the peak heat

release rate shall not exceed 100 kilowatts per square meter.

(6) An airplane that was type certificated after January 1, 1958, must comply with the heat release rate and smoke testing provisions of § 25.853(a-1) in effect on August 20, 1986, if there is a substantially complete replacement of the cabin interior components identified in that paragraph on or after August 20, 1990.

* * * * *

(8) Contrary provisions of this section notwithstanding, galley carts and galley standard containers that do not meet the heat release rate testing requirements of § 25.853(a-1) may be used in airplanes that must meet the requirements of (a)(1), (a)(2), (a)(5) or (a)(6) of this section, provided the galley carts or standard containers were manufactured prior to August 20, 1990.

(b) For airplanes type certificated after January 1, 1958, seat cushions, except those on flight crewmember seats, in any compartment occupied by crew or passengers must comply with the requirements pertaining to fire protection of seat cushions in § 25.853(c) effective on November 26, 1984.

PART 135—AIR TAXI OPERATORS AND COMMERCIAL OPERATORS

6. The authority citation for part 135 continues to read as follows:

Authority: 49 U.S.C. 1354(a), 1355(a), 1421-1431, and 1502; 49 U.S.C. 106(g) (Revised, Pub. L. 97-449, January 12, 1983), 49 CFR 1.47(a).

7. By amending § 135.169 by revising paragraph (a) to read as follows:

§ 135.169 Additional airworthiness requirements.

(a) Except for commuter category airplanes, no person may operate a large airplane unless it meets the additional airworthiness requirements of §§ 121.213 through 121.283, 121.307, and 121.311 of this chapter.

* * * * *

8. By amending § 135.170 by designating the present text as paragraph (a) and adding a new paragraph (b) to read as follows:

§ 135.170 Materials for compartment interiors.

* * * * *

(b) No person may operate a large airplane unless it meets the following additional airworthiness requirements:

(1) Except for those materials covered by paragraph (b)(2) of this section, all materials in each compartment used by the crewmembers or passengers must meet the requirements of § 25.853 of this chapter in effect as follows or later amendment thereto:

(i) Except as provided in paragraph (b)(i)(iv) of this paragraph, all airplanes manufactured on or after August 20, 1988, but prior to August 20, 1990, must comply with the heat release rate testing provisions of § 25.853(a-1) in effect on August 20, 1986, except that the total heat release over the first 2 minutes of sample exposure must not exceed 100 kilowatt minutes per square meter and the peak heat release must not exceed 100 kilowatts per square meter.

(ii) All airplanes manufactured on or after August 20, 1990, must comply with the heat release rate and smoke testing provisions of § 25.853(a-1) in effect on August 20, 1986.

(iii) Except as provided in paragraphs (b)(1) (v) and (vi) of this section, an airplane for which the application for type certificate was filed prior to May 1, 1972, must comply with the provisions of § 25.853 in effect on April 30, 1972, if there is a substantially complete replacement of the cabin interior on or after May 1, 1972.

(iv) Except as provided in paragraphs (b)(1) (v) and (vi) of this section, an airplane for which the application for type certificate was filed after May 1, 1972, must comply with the material requirements under which the airplane was type certificated if there is a substantially complete replacement of the cabin interior after that date.

(v) Except as provided in paragraph (b)(1)(vi) of this section, an airplane that was type certificated after January 1, 1958, must comply with the heat release testing provisions of § 25.853(a-1) in effect on August 20, 1986, if there is a substantially complete replacement of the cabin interior components identified in that paragraph on or after that date, except that the total heat release over the first 2 minutes of sample exposure shall not exceed 100 kilowatt-minutes per square meter and the peak heat release rate shall not exceed 100 kilowatts per square meter.

(vi) An airplane that was type certificated after January 1, 1958, must comply with the heat release rate and smoke testing provisions of § 25.853(a-1) in effect on August 20, 1986, if there is a substantially complete replacement of the cabin interior components identified in that paragraph on or after August 20, 1990.

(vii) Contrary provisions of this section notwithstanding, the Manager of the Transport Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, may authorize deviation from the requirements of paragraph (b)(1)(i), (b)(1)(ii), (b)(1)(v), or (b)(1)(vi), of this section for specific components of the cabin interior that do

not meet applicable flammability and smoke emission requirements, if the determination is made that special circumstances exist that make compliance impractical. Such grants of deviation will be limited to those airplanes manufactured within 1 year after the applicable date applicable date specified in this section and those airplanes in which the interior is replaced within 1 year of that date. A request for such grant of deviation must include a thorough and accurate analysis of each component subject to § 25.853(a-1), the steps being taken to achieve compliance, and, for the few

components for which timely compliance will not be achieved, credible reasons for such noncompliance.

(viii) Contrary provisions of this section notwithstanding, galley carts and standard galley containers that do not meet the heat release rate testing requirements of § 25.853(a-1) may be used in airplanes that must meet the requirements of (b)(1)(i), (b)(1)(ii), (b)(1)(iv), or (b)(1)(vi), of this section provided the galley carts or standard galley containers were manufactured prior to August 20, 1990.

(2) For airplanes type certificated after January 1, 1958, seat cushions, except those on flight crewmembers seats, in any compartment occupied by crew or passengers must comply with the requirements pertaining to fire protection of seat cushions § 25.853(c) effective November 26, 1984.

Issued in Washington, DC, on April 2, 1990.

Thomas E. McSweeney,

Acting Director, Aircraft Certification Service.

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