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Part XI

**Department of
Transportation**

Federal Aviation Administration

**14 CFR Parts 25 and 121
Design Standards for Fuel Tank Access
Covers; Final Rule**

DEPARTMENT OF TRANSPORTATION**Federal Aviation Administration****14 CFR Parts 25 and 121**

[Docket No. 25614; Amdts Nos. 25-69 and 121-208]

RIN 2120-AC58

Design Standards for Fuel Tank Access Covers**AGENCY:** Federal Aviation Administration (FAA), DOT.**ACTION:** Final rule.

SUMMARY: This amendment requires that fuel tank access covers on transport category airplanes be designed to minimize penetration by likely foreign objects, and be fire resistant. This amendment also requires that all turbine powered airplanes operated in air carrier service after October 30, 1991 meet these new standards.

EFFECTIVE DATE: October 30, 1989.**FOR FURTHER INFORMATION CONTACT:**

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SUPPLEMENTARY INFORMATION:**Background**

These amendments are based on Notice of proposed rulemaking (NPRM) No. 88-10, which was published in the Federal Register on May 23, 1988 (53 FR 18526). The notice proposed to require that the fuel tank access panels on transport category airplanes be designed to minimize penetration by likely foreign objects, and be fire resistant. It also proposed to require all turbine powered airplanes operated in air carrier service after October 30, 1991 meet these new standards. Since then, the terminology has been changed from "Access Panels" to "Access Covers" to more accurately describe the parts and to avoid confusion with wing panels.

Several fuel tank access covers have failed in service due to impact with high energy objects such as failed tire tread material and engine debris following engine failures. The amendments to part 25 will ensure that all access covers on all fuel tanks are designed or located to minimize penetration by likely foreign objects and are fire resistant.

In addition, part 121 is amended to require that the fuel tank access covers on all turbine-powered transport category airplanes used in air carrier service meet these new standards.

Airplanes powered with reciprocating engines are not included since service experience does not indicate that fuel tank access covers on those airplanes have been a safety problem.

Discussion of Comments

The public response to the request for comments on Notice 88-10 was generally supportive of the new requirements.

One commenter believes it can be successfully argued that the present fuel tank access covers satisfy the general requirements of the rule since the FAA has not adopted testing standards for either impact or fire resistance. The commenter further states that unless the amendment is strengthened to require that the access covers be identical in material and at least equal to the lower wing panels with regard to all physical and thermal properties, the amendment will fall short of its stated purpose.

Specific rigid standards for impact resistance were not considered practical because of the wide range of likely debris which could impact the fuel tank access covers. The size, speed, and mass of tires vary greatly depending on the size and landing gear configuration of the airplane. Also, the size and energy level of engine debris are dependent on the size, location, and failure mode of the engine. (Advisory Circular 20-128 and available service history with airplanes of similar size and configuration provide guidance in that regard.) Furthermore, it may not be practical, or even necessary, to provide access covers with properties which are identical to those of the adjacent wing lower skin panels since the wing panels usually vary in thickness from station to station and may, at certain stations, have impact resistance far in excess of that needed for any likely impact. Since it is not practical to establish specific testing standards, the phrase, "minimize penetration and deformation" is used in § 25.963(e)(1). This means that an applicant must design access covers which are resistant to penetration and deformation to the greatest extent that is feasible, taking into account costs and other factors anticipated in actual service. It would, of course, not be considered feasible to design the access covers to be more impact resistant than the nominal impact resistance of the surrounding wing surfaces.

Although the proposed rule does not dictate the specific means to show that the fuel tank access covers "minimize penetration and deformation," an applicant would probably choose to do so by testing covers using debris of a type, size, trajectory, and velocity that

represent conditions anticipated in actual service for the airplane model involved. This would include consideration of available materials, construction methods, and attachment methods, as well as the resistance of the surrounding surfaces to penetration and deformation.

Under the provisions of Airworthiness Directive (AD) 87-02-07 (52 FR 518; January 7, 1987), operators of Boeing 737-100 and 737-200 series airplanes are required to replace existing access covers located within the engine debris strike zone with improved covers which are more resistant to impact. (This proposed rule would require replacement of any other fuel tank access covers on airplanes of these models that are subject to tire debris damage.) Airworthiness Directive 88-12-10 (54 FR 23643; June 2, 1989) requires similar replacement of the access covers of Boeing 747 airplanes. The redesigned covers required to comply with those ADs are specified thicknesses of aluminum plate. Those are examples of access covers which "minimize" penetration and deformation.

"Fire resistant" is used as the standard for resistance of the access covers to flame penetration because it is already defined in Part 1 of the Federal Aviation Regulations (FAR) and is well-understood by the aircraft industry.

The FAA does not concur that all fuel tank access covers of transport category airplanes presently in service will meet the new standards with regard to either impact resistance or fire resistance. While it is correct that many of these airplanes have no fuel tank access covers located in areas which are vulnerable to fire or debris impact, there are others in service which do have covers which are located in such areas and are not designed to "minimize" penetration and deformation, as described above.

Several commenters question the accuracy of the cost analysis. They believe that the total number of access covers which must be replaced is less than the number quoted in the cost analysis and that many of those have already been replaced. They also state, on the other hand, that the actual cost per cover is much higher than that quoted in the analysis.

Subsequent to the completion of the regulatory evaluation for this final rule, one commenter provided a late estimate of the cost of the required replacement access covers. The FAA reviewed the additional data and found that there may be a small additional cost which would not substantially affect the conclusion of the regulatory estimate.

The commenter's estimate of the number of affected airplanes is not relevant to the proposed amendment to Part 121 because it addresses the number of airplanes in operation worldwide rather than those operated by U.S. air carriers under the provisions of part 121.

The cost analysis has been reviewed in light of the comments received. Due to the many variable factors involved, the actual cost may vary somewhat. Nevertheless, the FAA considers the analysis to be within the range of accuracy necessary to show the overall cost impact of this rule.

One commenter requests the two years compliance period be extended to five years to coincide with an operator's extended check of the internal fuel tanks.

The FAA considers that a compliance period of two years from the effective date of this amendment is adequate considering the extent of coordination with the industry in developing this rule and the modifications already accomplished on the Model 737 under the requirements of Airworthiness Directive (AD) 87-02-07. Furthermore, the commenter provided no evidence that compliance prior to the next check of the internal fuel tanks would present an undue hardship.

Several commenters believe that the proposed rule is vague as to which airplanes and which covers on those airplanes would have to be retrofitted. Also, they believe that the likely strike areas are not adequately defined.

As discussed above, because of the large number of relevant factors, the FAA has determined that it is not possible to establish specific objective criteria to define the term "minimize" in the proposal. However, based on analyses of service experience, the FAA has determined that currently certificated Boeing model airplanes do not "minimize" penetration and deformation. All turbine powered transport category airplanes must be assessed for possible retrofit with new covers. Covers located within the strike zone from engine or auxiliary power unit debris, as defined in Advisory Circular 20-128, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failures, and covers located within the strike zone from tire fragments must meet the new requirements. For the purpose of showing compliance with this rule, access covers located within 15 degrees of the plane of rotation of any tire must meet the new requirements. Minor editorial changes have been made in this regard.

Regulatory Evaluation Summary

Six comments which specifically address the costs and benefits of this rulemaking were submitted to the FAA by air carriers, and representative air carrier and manufacturer industry organizations, following publication of Notice 88-10. The FAA has revised its evaluation of the costs and benefits of this rulemaking in response to these comments.

Costs

The initial regulatory evaluation of Notice 88-10 projected that 26,812 access covers, at a material cost of \$210 and an installation cost of \$270 per cover, would require replacement in the current fleet of Boeing airplanes subject to part 121 of the Federal Aviation Regulations (FAR). Total costs were projected to be \$12.9 million.

Several commenters suggest that these initial projections underestimate the total cost of cover replacement. One commenter states that fuel tank access covers cost \$591 each. Another commenter, representing aerospace manufacturers, provides a range of manufacturer-supplied cost estimates for retrofitting individual types of airplane. According to this commenter, the projected cost of retrofit kits ranges from \$3,300 for a Boeing Model 727, with 2 covers requiring replacement, to \$36,200 for a Boeing Model 707, with 16 covers requiring replacement. These estimates can be recalculated to show that the material cost per access cover will range from \$600 for a Boeing Model 767 to \$2,000 for a Boeing Model 707, and average \$1,500 for the total affected fleet of airplanes. (Although the commenter also cited the cost of retrofitting a Boeing Model 720, it is actually irrelevant because no airplanes of that model remain in U.S. air carrier service.)

Since the latter cost estimates are provided by the manufacturer of the affected airplanes, and project the cost of replacement covers that have been designed and are in production, the FAA concurs with these estimates and has revised its cost analysis accordingly.

Revised compliance cost estimates for the final rule are \$19.7 million in 1988 dollars, and \$17.1 million discounted present value (employing a 10 percent discount rate).

Additional assumptions employed in this analysis include the following:

- This rule will affect 2,225 Boeing airplanes in part 121 service.
- Retrofit costs will be incurred over a two year period following the effective date of this rule.
- Manufacturer-supplied estimates of required labor hours range from 14 on

the Boeing Model 727 to 30 on the Model 707. In this analysis, aircraft mechanic labor hours are valued at \$35 per hour.

The FAA acknowledges concerns expressed by some commenters that the initial regulatory evaluation of Notice 88-10 may have overestimated the number of access covers requiring replacement (26,812 covers). In this analysis of the final rule, the FAA has employed the manufacturer-supplied estimates of the number of access covers requiring replacement on each affected airplane type (12,356 covers). It must be noted that these projections represent a worst-case scenario. The total costs may be even lower than estimated for this final rule because fewer covers may require replacement in actual practice.

The FAA disagrees with the concern expressed by commenters that the two-year compliance period will force air carriers to pull their airplanes out of service, thus incurring additional lost opportunity costs. Since replacement covers are already in production, a lack of available parts should not be a factor in preventing carriers from meeting the compliance deadline. Furthermore, the FAA expects that the mandated retrofits can easily be accomplished during an aircraft's regularly scheduled "C" check maintenance and inspection period.

Benefits

Several commenters indicate that the FAA's initial regulatory evaluation overestimates the benefits of this rulemaking. The FAA disagrees with these comments. Although penetrations of fuel tank access covers by foreign objects or debris have caused only one catastrophic accident in the last 20 years, the 1985 Boeing Model 737 crash in Manchester, England (with 55 fatalities), the FAA has identified a total of 24 incidents of access cover penetrations during that period. If such incidents continue to occur, the probability remains that failure of an access cover to contain such a strike could result in the loss of an airplane and its passengers. This analysis therefore estimates benefits of requiring installation of penetration and fire-resistant fuel tank access covers based on the prevention of one such incident.

In the FAA's final regulatory evaluation of these amendments, expected benefits remain as estimated in the initial regulatory evaluation: A minimum of \$29.0 million (discounted present value), based on the probability of preventing at least one accident over the next 20 years of a magnitude similar to the Manchester accident.

Based on this analysis, the FAA believes this rule to be cost-effective: the minimum expected benefit of \$29.0 million (discounted present value) exceeds the expected cost of \$17.1 million (discounted present value) by approximately \$11.9 million.

International Trade Impact Assessment

This amendment will have little or no impact on trade for both U.S. firms doing business in foreign countries and foreign firms doing business in the United States.

There will be no advantage with respect to future type designs for airplanes manufactured either in the United States or foreign countries, since U.S. certification rules are applicable to both foreign and domestic manufacturers selling aircraft in the United States.

With respect to existing designs, the disadvantage to U.S. air carriers vis-a-vis foreign carriers is minimal because the cost of compliance is a relatively small amount for most airplanes. Only 9 percent of the affected airplanes are expected to require one-time expenditures greater than \$16,000 per airplane. Boeing Model 727's, representing 54 percent of the affected airplanes, will require total expenditures of less than \$4,000 per airplane. Furthermore, it is common for foreign airworthiness authorities to adopt regulations similar to those issued by the Federal Aviation Administration. Therefore, it is possible that foreign operators of Boeing airplanes will be required to modify their airplanes as well.

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 RFA requires government agencies to review rules which may have "a significant economic impact on a substantial number of small entities."

FAA Order 2100.14 defines a "substantial number of small entities" as more than one-third, and no fewer than eleven, of the small entities subject to the proposed rule. The order also indicates that an operator owning nine or fewer aircraft for hire is considered to be a "small entity."

This final rule has a cost impact only on air carriers which operate airplanes under Part 121 of the Federal Aviation Regulations. The FAA has identified

approximately 82 air carriers that own airplanes subject to Part 121, and two carriers which operate a total of nine or fewer aircraft. Of these 82 operators, only 20 (less than one-third), operate with at least one of the Boeing airplanes affected by this final rule.

The FAA therefore estimates that this final rule will not have an adverse economic impact on a substantial number of small entities.

The FAA has not identified a positive economic impact on a substantial number of small entities. The only small entities that could benefit economically from this rule are manufacturers of replacement panels. The best available information suggests that fewer than eleven outside suppliers would be contracted by Boeing to produce the required access covers.

Federalism Implications

The regulations adopted 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 final rule will not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

For the reasons given earlier in the preamble, the FAA has determined that this is not a major regulation as defined in Executive Order 12291. In addition, the FAA certifies that this rule does not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act, since none are affected. Since the regulatory document concerns a matter on which there is substantial public interest, the FAA has determined that this document is significant as defined in Department of Transportation Regulatory Policies and Procedures (44 FR 11034; February 26, 1979).

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.

Adoption of the Amendments

Accordingly, parts 25 and 121 of the Federal Aviation Regulations (FAR), 14 CFR parts 25 and 121, are amended 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) (Revised Pub. L. 97-449, January 12, 1983); and 49 CFR 1.47(a).

2. By amending § 25.963 by adding paragraph (e) to read as follows:

§ 25.963 Fuel tanks: general.

* * * * *

(e) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:

(1) All covers located in an area where experience or analysis indicates a strike is likely must be shown by analysis or tests to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris.

(2) All covers must be fire resistant as defined in part 1 of this chapter.

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

3. 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).

4. By amending part 121 by adding a new § 121.316 to read as follows:

§ 121.316 Fuel tanks.

Each turbine powered transport category airplane operated after October 30, 1991, must meet the requirements of § 25.963(e) of this Chapter in effect on October 30, 1989.

Issued in Washington, DC, on September 25, 1989.

James B. Busey,
Administrator.

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