DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–1999–5835; Notice No. 99–08]

RIN 2120–AG72

Revised Landing Gear Shock Absorption Test Requirements

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This document proposes to revise the landing gear shock absorption test requirements for transport category airplanes by incorporating changes developed in cooperation with the Joint Aviation Authorities (JAA) of Europe and the U.S. and European aviation industry through the Aviation Rulemaking Advisory Committee (ARAC). This action is necessary because the increasing complexity of landing gear shock absorption systems and the improvements in other requirements concerning landing loads have rendered the current requirements inconsistent and outdated. In addition, differences between the current United States and European requirements impose unnecessary costs on airplane manufacturers. These proposals are intended to update the landing gear requirements to be consistent with other requirements, to reflect modern technology, and to achieve common requirements and language between the Federal Aviation Regulations and the European Joint Aviation Requirements (JAR) without reducing the level of safety provided by the regulations and industry practices.

DATES: Comments must be received on or before October 18, 1999.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: U.S. Department of Transportation, Dockets, Docket No. FAA–1999–5835, 400 Seventh Street SW., Room Plaza 401, Washington, D.C. 20590. Comments may also be submitted electronically to the following address: 9–NPRM–CMTS@faa.gov. Comments may be examined in Room Place 401 between 10 a.m. and 5 p.m., weekdays, except Federal holidays. In addition, the FAA is maintaining an information docket of comments in the Transport Airplane Directorate (ANM–100), FAA, 1601 Lind Avenue SW., Renton, WA 98055–4056. Comments in the information docket may be examined weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: James Haynes, Airframe/Cabin Safety Branch, ANM–115, Transport Airplane Directorate, Aircraft Certification Service, FAA, 1601 Lind Avenue, SW., Renton, WA 98055–4056; telephone (425) 227–2131.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments relating to any environmental, energy, or economic impact that might result from adopting the proposals contained in this action are invited. Substantive comments should be accompanied by cost estimates. Commenters should identify the regulatory docket or notice number and submit comments in duplicate to the Docket address above. All comments received on or before the closing date for comments will be considered by the Administrator before taking action on this proposed rulemaking. Late filed comments will be considered to the extent practicable. The proposals contained in this action may be changed in light of comments received. All comments received will be available in the Docket, both before and after the comment period closing date, for examination by interested persons. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Persons 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. FAA–1999–5835.'' The postcard will be date/time stamped and returned to the commenter.

Availability of NPRM

An electronic copy of this document may be downloaded using a modem and suitable communications software from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703–321–3339), the Government Printing Office's electronic bulletin board service (telephone: 202–512–1661), or the FAA's Aviation Rulemaking Advisory Committee Bulletin Board service (telephone: 800–322–2722 or 202–267–5948).

Internet users may reach the FAA's web page at http://www.faa.gov/avr/arm/nprm.htm or the Government Printing Office's web page at http://www.access.gpo.gov/nara for access to recently published rulemaking documents.

Any person may obtain a copy of this document by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591; or by calling (202) 267–9680. Communications must identify the docket or notice number of this NPRM. Persons interested in being placed on a mailing list for future rulemaking documents should also request a copy of Advisory Circular No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Background

The manufacturing, marketing and certification of transport airplanes is increasingly an international endeavor. In order for U.S. manufacturers to export transport airplanes to other countries the airplane must be designed to comply, not only with the U.S. airworthiness requirements for transport airplanes (14 CFR part 25), but also with the transport airworthiness requirements of the countries to which the airplane is to be exported.

The European countries have developed a common airworthiness code for transport airplanes that is administered by the Joint Aviation Authorities (JAA) of Europe. This code is the result of a European effort to harmonize the various airworthiness codes of the European countries and is called the Joint Aviation Requirements (JAR)–25. It was developed in a format similar to part 25. Many other countries have airworthiness codes that are aligned closely to part 25 or to JAR–25, or they use these codes directly for their own certification purposes.

The Aviation Rulemaking Advisory Committee (ARAC) was established by the FAA on February 15, 1991, with the purpose of providing information, advice, and recommendations to be considered in rulemaking activities. By notice in the **Federal Register** (59 FR 30081, June 10, 1994), the FAA assigned several new tasks to an ARAC working group of industry and government structural loads specialists from Europe, the United States, and Canada. Task 6 of the working group charter concerned the shock absorption test requirements for landing gear. The ARAC working group has completed its work for this task and the ARAC has made recommendations to the FAA by letter dated October 29, 1997.

Although the requirements for landing gear shock absorption tests are essentially the same between the Federal Aviation Regulations and JAR, the requirements do not address the capabilities of modern technology and

do not take into account other related changes in the requirements for landing gear load conditions that have already been incorporated into other sections of the Federal Aviation Regulations. When the landing loads requirements for transport airplanes were originally developed, they required the landing load factors to be determined and applied to the airplane. The airplane was treated as a rigid body and the landing loads were applied to this rigid representation of the airplane for the purpose of structural analysis. For the early landing gear systems, analysis alone was considered sufficient for determining the landing load factor that would be applied to the rigid airplane. It was only necessary to determine the landing load factor (by analysis or tests) and this load factor would then be used to design and substantiate the airplane for the landing load conditions.

The development of more complex landing gear systems, for which analysis alone was unreliable, led to the adoption of a requirement to verify the landing load factor by actual shock absorption tests. This requirement was added to the Civil Air Regulations (CAR) part 4b, which was the predecessor to part 25. These shock absorption tests were allowed by § 4b.200 of the CAR to be free drop tests in which the gear alone, could be dropped in free fall to impact the ground. In these tests, mass is added to represent the proportion of the airplane weight on the landing gear unit, and the mass may be reduced to account for the effects of airplane lift acting during the landing impact. Later, the corresponding requirement in § 25.723(a), was modified to allow the substantiation of some changes to the landing gear shock absorption systems by analysis alone without verification by tests.

Part 25 currently requires the landing loads to be determined by accounting for the dynamic flexible airplane. In addition, the landing gear shock absorption systems have become even more sophisticated. At the same time, the ability to develop highly sophisticated computer models of landing gear and airplane structures has also improved. In order to determine the airplane loads from the landing load conditions, it is no longer sufficient to determine just the load factor from a drop test of a landing gear unit. A comprehensive analysis of the combined dynamic systems for the landing gear and airplane are essential in order to determine the structural design loads for the airplane. In developing this dynamic model, it is necessary to provide an accurate representation of all the landing gear dynamic characteristics. This includes the energy absorption characteristics and the time histories of force and displacement during a landing impact. The current §§ 25.473(d) and 25.723(a) for shock absorption tests require just the determination of the limit landing load factor from the drop test.

Discussion

The proposed revisions to § § 25.473(d) and 25.723(a) would provide for the new objective of the landing gear energy absorption tests which would be to validate the landing gear dynamic characteristics rather than to directly determine landing gear load factors. These revisions would require that these characteristics be substantiated over the range of landing conditions and airplane configurations expected in service. The manufacturer would be expected to substantiate the landing gear dynamic characteristics over the full range of weight conditions and configurations. As a minimum, the energy absorption characteristics would be confirmed by an energy absorption test at the weight condition for landing (maximum takeoff weight or maximum landing weight) which provides the maximum impact energy. This is in contrast to the current § § 25.473(d) and 25.723(a) which specifically require energy absorption tests at both the maximum landing weight condition and the maximum takeoff weight condition. The proposed rule would continue to provide for the substantiation of minor changes by analyses. To provide guidance in complying with the new proposed rule, a new advisory circular, AC 25.723–1, Shock Absorption Tests, is proposed.

The proposals for the revised § § 25.473(d) and 25.723(a) take into account the potential for sophisticated computer simulations that accurately represent the dynamic characteristics. These are also consistent with improvements in the landing load requirements that necessitate an accurate representation of the landing gear shock absorption characteristics. These proposals also provide more flexibility for the airplane manufacturer to determine the range of conditions and configurations over which to validate the analytical model for the landing conditions. The extent to which this analytical model could be extrapolated to include future design changes would depend on the range of conditions and configurations originally selected by the manufacturer for validation of the model.

The current § § 25.725 and 25.727 are proposed to be deleted as regulatory requirements and would be set forth in the new proposed AC 25.723–1. These criteria would be modified to reflect the advisory nature of the material as well as the revised objective of determining landing gear dynamic characteristics instead of landing gear limit inertia load factors. For the most part, these rules currently provide acceptable means of conducting energy absorption tests by means of a drop test. Section 25.725 provides an acceptable means of conducting a limit drop test for compliance with § 25.723(a), and § 25.727 provides an acceptable means of conducting a reserve energy drop test in compliance with § 25.723(b). Most of the guidance is limited to a ''free'' drop test in which a reduced effective weight is used to represent lift during the landing impact. The only item in these two sections that is considered to be regulatory in nature is the current § 25.725(c) concerning the attitude of the landing gear and the representation of drag loads during the tests. Therefore this paragraph has been modified to apply to all types of landing gear energy absorption tests (not just drop tests) and it is now set forth in § 25.723(a)(2) of the proposed rule. It is expected that these revisions will have no effect on the level of safety provided by the requirement.

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), there are no requirements for information collection associated with this proposed rule.

International Compatibility

The FAA has reviewed corresponding International Civil Aviation Organization international standards and recommended practices and Joint Aviation Authorities regulations, where they exist, and has identified no differences in these proposed amendments and the foreign regulations.

Regulatory Evaluation Summary

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this proposed

rule is not ''a significant regulatory action'' under section 3(f) of Executive Order 12866 and, therefore, is not subject to review by the Office of Management and Budget. This proposed rule is not considered significant under the regulatory policies and procedures of the Department of Transportation (44 FR 11034, February 26, 1979). This proposed rule would not have a significant impact on a substantial number of small entities and would not constitute a barrier to international trade. The FAA invites the public to provide comments and supporting data on the assumptions made in this evaluation. All comments received will be considered in the final regulatory evaluation.

The proposed requirements, applicable to future type certificated transport category airplanes, would result in two regulatory changes: (1) Utilizing landing gear energy absorption tests to validate the landing gear dynamic characteristics rather than the limit load factor value, and (2) confirming energy absorption characteristics by requiring tests at either the maximum landing weight or maximum takeoff weight condition, whichever provides the maximum landing impact energy. This is in contrast to current requirements which require tests at both weight conditions.

The test results would be used to develop the analytical modeling of the landing gear dynamic characteristics. These regulatory changes would not result in any physical change in the way landing gears are tested: the attitude of the gear being usually simulated directly by orienting the gear on the rig and drag loads being applied by spinning the wheel up to the ground speed. Therefore, it would not impose additional costs on manufacturers. This was confirmed by two manufacturers.

Significant cost savings may result from not having to test both at maximum landing weight and maximum takeoff weight, but instead, conducting shock absorption tests only for the conditions associated with maximum energy. One manufacturer estimates that these tests would result in 15 fewer test conditions per airplane certification. At a cost of $5,000 per condition, the total cost savings would reach $75,000 per airplane certification. Another manufacturer estimates a cost savings of approximately $190,000 for a ten-year period. Additionally, by harmonizing the standards of the Federal Aviation Regulations and JAR, the proposed rule would yield cost savings by eliminating duplicate certification activities.

Based on the finding of regulatory cost-savings, coupled with the cost-savings realizable from harmonization, and the expectation that these revisions will have no effect on the level of safety provided by the test requirements, the FAA has determined that the proposed rule would be cost-beneficial.

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organization, and governmental jurisdictions subject to regulation.'' To achieve that principal, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act. However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and an RFA is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The proposed rule would affect manufacturers of transport category airplanes produced under future new airplane type certifications. For manufacturers, a small entity has 1,500 or fewer employees. Since no part 25 airplane manufacturer has 1,500 or fewer employees, FAA certifies that the proposed rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Statement

The provisions of this proposed rule would have no adverse impact on trade for both U.S. firms doing business in foreign countries and foreign firms doing business in the United States. By making U.S. landing gear test requirements conform with JAR requirements, international trade in aircraft would be enhanced by eliminating redundant testing costs for part 25 airplane manufacturers, possibly resulting in some cost savings for users of aircraft.

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. Thus, in accordance with Executive Order 12612, it is determined that this proposal does not have sufficient federalism implications to warrant the preparation of a federalism assessment.

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), codified in 2 U.S.C. 1501–1571, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed ''significant intergovernmental mandate.'' A ''significant intergovernmental mandate'' under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This proposed rule does not contain a Federal intergovernmental or private sector mandate that exceeds $100 million a year.

Regulations Affecting Interstate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when

modifying regulations in Title 14 of the CFR in a manner affecting interstate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. Because this proposed rule would apply to the certification of future designs of transport category airplanes and their subsequent operation, it could, if adopted, affect interstate aviation in Alaska. The FAA therefore specifically requests comments on whether there is justification for applying the proposed rule differently in interstate operations in Alaska.

Environmental Analysis

Federal Aviation Administration Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment or environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this rulemaking, which if implemented may cause a significant impact on the human environment, qualifies for a categorical exclusion.

Energy Impact

The energy impact of the proposed rule has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) and Public Law 94–163, as amended (42 U.S.C. 6362). It has been determined that it is not a major regulatory action under the provisions of the EPCA.

List of Subjects 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The Proposed Amendments

In consideration of the foregoing, the Federal Aviation Administration proposes to amend part 25 of Title 14, Code of Federal Regulations 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. 106(g), 40113, 44701, 44702 and 44704.

2. Section 25.473 is amended by revising paragraph (d) to read as follows:

§ 25.473 Landing load conditions and assumptions.

* * * * *

(d) The landing gear dynamic characteristics must be validated by tests as defined in § 25.723(a).

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3. Section 25.723 is amended by revising paragraph (a) to read as follows:

§ 25.723 Shock absorption tests.

(a) Except as provided in paragraph (a)(3) of this section, the landing gear dynamic characteristics used for design must be validated by energy absorption tests. The dynamic characteristics must be substantiated for the range of landing conditions, airplane configurations, and service variations expected in operation.

(1) The configurations subjected to energy absorption tests must include at least the maximum landing weight or the maximum takeoff weight, whichever produces the greater value of landing impact energy.

(2) The test attitude of the landing gear unit and the application of appropriate drag loads during the test must simulate the airplane landing conditions in a manner consistent with the development of rational or conservative limit loads.

(3) Changes in previously approved design weights and minor changes in design may be substantiated by analyses based on previous tests conducted on the same basic landing gear system that has similar energy absorption characteristics.

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§ 25.725 [Removed and Reserved]

4. Remove and reserve § 25.725.

§ 25.727 [Removed and Reserved]

5. Remove and reserve § 25.727.

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Issued in Washington D.C. on June 10, 1999.

Frank Paskiewicz,

Acting Director, Aircraft Certification Service.

[FR Doc. 99–15381 Filed 6–17–99; 8:45 am]

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