Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Loads and Dynamics Harmonization Working Group

Task 4 – Interaction of Systems and Structure

Task Assignment

Aviation Rulemaking Advisory Committee; Transport Airplane and Engine Issues

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of new task assignments for the Aviation Rulemaking Advisory Committee.

SUMMARY: Notice is given of new task assignments for the Loads and Dynamics Harmonization Working Group of the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of the ARAC.

FOR FURTHER INFORMATION CONTACT: Michael H. Borfitz, Assistant Executive Director, Aviation Rulemaking Advisory Committee, Transport Airplane and Engine Issues, FAA Engine & Propeller Directorate, 12 New England Executive Park, Burlington, Massachusetts 01803; telephone (617) 238–7110, fax (617) 238–7199.

SUPPLEMENTARY INFORMATION: On January 22, 1991 (56 FR 2190), the Federal Aviation Administration (FAA) established the Aviation Rulemaking Advisory Committee (ARAC). The committee provides advice and recommendations to the FAA Administrator, through the Associate Administrator for Regulation and Certification, on the full range of the FAA's rulemaking activities with respect to aviation-related issues..

In order to develop such advice and recommendations, the ARAC may choose to establish working groups to which specific tasks are assigned. Such working groups are comprised of experts from those organizations having an interest in the assigned tasks. A working group member need not be a representative of the full committee. One of the working groups established by the ARAC is the Loads and Dynamics Harmonization Working Group.

The FAA announced at the Joint Aviation Authorities (JAA)-Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Canada June 2–5, 1992, that it would consolidate within the ARAC structure an ongoing objective to "harmonize" the Joint Aviation Requirements (JAR) and the Federal Aviation Regulations (FAR).

Tasks

The Loads and Dynamics Harmonization Working Group's tasks are as follows:

Task 1—Interaction of Systems and Structure: Review existing special conditions for fly-by-wire airplanes and existing requirements for control systems, including automatic and/or power-operated systems, and recommend to the ARAC any new revised general requirements needed for flight control systems and structures affected by those systems (§§ 25.302, 25.671, 25.1329, part 25 appendix K).

Task 2—Continuous Turbulence Loads: Review the requirement for the continuous turbulence standard in light of the ARAC proposal for a tuned discrete gust requirement in order to determine whether the continuous turbulence requirement should be revised or removed from the FAR/JAR for better consistency with the new proposed tuned discrete gust criteria (§ 25.305(d)).

Task 3—Strength and Deformation: Review the recent requirements adopted in the FAR by Amendment 25–77 (for the design of transport airplanes against buffet and forced structural vibrations) and consider appropriate changes for the JAR and FAR to harmonize these rules (§§ 25.305 (e) and (f)).

Task 4—Design Flap Speeds: Review the current flap design loads requirements to resolve differences in interpretation between the FAA and JAA concerning the structural design stall speeds on which the flap design speeds are based. Recent measurements of gust speeds at low altitudes, where flaps are normally extended, indicate a more severe gust environment may be present. Review all aspects of the flap design load requirements, including the design airspeeds, vertical and head-on design gust criteria, and the effects of automatic retraction and load relief systems (§ 25.335(e)).

Task 5—Residual Strength Loads for Damage Tolerance: Review the differences in residual strength design load requirements between the FAR and JAR and resolve differences to harmonize this rule. Prepare a Notice of Proposed Rulemaking or make recommendations to other ARAC efforts concerning FAR § 25.571, so that they can be included in rulemaking that may be forthcoming from those efforts (§ 25.571(b)).

Task 6—Shock Absorption Tests: Review the changes recently introduced into the JAR that have resulted in differences between the FAR and JAR in regard to the requirement for shock absorption tests. Review those changes in view of harmonizing the FAR and JAR (§ 25.723(a)).

Task 7—Rough Air Speed: The ARAC has proposed a new § 25.1517 concerning rough air speed design standards in its proposal for a tuned discrete gust requirement. This action is harmonized with the current JAR 25.1517; however, further changes in the rough air speed requirement may be needed in both the FAR and JAR. Review JAR 25.1517 and the new proposed FAR 25.1517 to determine if further changes are needed. If so, prepare a Notice of Proposed Rulemaking, or, if possible, combine these changes with other rulemaking efforts (§ 25.1517).

Task 8—Taxi, Takeoff, and Landing Roll: Prepare an advisory circular that establishes criteria that may be used to calculate rough runway and taxiway loads, as required by §§ 25.491, 25.235, and 25.305.

Task 9—Braked Roll Conditions: Review the provisions of § 25.493 of the FAR and JAR concerning the braked roll condition and finalize a harmonized Notice of Proposed Rulemaking.

Reports

For each task listed, the Loads and Dynamics Harmonization Working Group should develop and present to the ARAC:

1. A recommended work plan for completion of the task, including the rationale supporting such plan, for consideration at the meeting of the ARAC to consider transport airplane and engine issues held following publication of this notice;
2. A detailed conceptual presentation on the proposed recommendation(s), prior to proceeding with the work stated in item 3. below;
3. A draft Notice of Proposed Rulemaking, with supporting economic and other required analyses, and/or any other related guidance material or collateral documents the working group determines to be appropriate; or, if new or revised requirements or compliance methods are not recommended, a draft report stating the rationale for not making such recommendations; and
4. A status report at each meeting of the ARAC held to consider transport airplane and engine issues.

Participation in Working Group Task

An individual who has expertise in the subject matter and wishes to become a member of the working group should write to the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the task(s), and stating the expertise he or

she would bring to the working group. The request will be reviewed with the assistant chairman and working group leader, and the individual will be advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the information and use of the Aviation Rulemaking Advisory Committee are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the Aviation Rulemaking Advisory Committee will be open to the public, except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the working group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on June 3, 1994.

Chris A. Christie,

Executive Director, Aviation Rulemaking Advisory Committee.

[FR Doc. 94-14147 Filed 6-9-94; 8:45 am]

BILLING CODE 4910-13-M

Recommendation Letter

Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Pratt & Whitney
A United Technologies Company

#4

December 20, 1999

Department of Transportation
Federal Aviation Administration
800 Independence Ave, SW
Washington, D.C. 20591

Attention: Mr. Tom McSweeny, Associate Administrator for Regulation and Certification

Reference: ARAC Tasking, Federal Register, June 10, 1994 and November 26, 1999

Dear Tom,

In accordance with the reference tasking statement, the ARAC Transport Airplane and Engine Issues Group is pleased to forward the attached draft NPRM for Interaction of Systems and Structures (25.302 and Appendix K). This ARAC recommendation was prepared by the Loads and Dynamics Harmonization Working Group of the TAEIG.

Sincerely,

Craig R. Bolt

C. R. Bolt
Assistant Chair, TAEIG
Phone: 860-565-9348, Fax 860-557-2277, M/S 162-24
Email: boltcr@pweh.com

cc: Dorenda Baker – FAA-NWR*
Tony Fazio – FAA. ARM-1*
Kristin Larson – FAA-NWR
Larry Hanson, Gulfstream*
*letter only

Acknowledgement Letter

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave S W
Washington, D C 20591

MAY 3 2004

Mr. Craig R. Bolt
Manager, Product Development and Validation
Pratt & Whitney
Mail Stop 162-12
East Hartford, CT 06108

Dear Mr. Bolt:

In an effort to clean up pending Aviation Rulemaking Advisory Committee (ARAC) recommendations on Transport Airplane and Engine Issues, the recommendations from the following working groups have been forwarded to the proper Federal Aviation Administration offices for review and decision. We consider your submittal of these recommendations as completion of the ARAC tasks. Therefore, we have closed the tasks and placed the recommendations on the ARAC website at http://www.faa.gov/avr/arm/arac/index.cfm

Date	Task	Working Group
December 1999	Interaction of Systems and Structure Part 33 Static Parts	Loads and Dynamics Harmonization Working Group
March 2000	Part 35/JARP: Airworthiness Standards Propellers	Engine Harmonization Working Group
April 2000	Flight Characteristics in Icing conditions	Flight Test Harmonization Working Group
May 2000	Thrust Reversing Systems	Powerplant Installation Harmonization Working Group
September 2000	Lightning Protection Requirements	Electromagnetic Effects Harmonization Working Group
July 2001	Main Deck Class B Cargo Compartments	Cargo Standards Harmonization Working Group
April 2002	Design Standard for Flight Guidance	Flight/Guidance Systems Harmonization Working Group

ANM-97-135-A
21264

I wish to thank the ARAC and the working groups for the resources they spent in developing these recommendations. We will continue to keep you apprised of our efforts on the ARAC recommendations at the regular ARAC meetings.

Sincerely,

Anthony F. Fazio
Executive Director, Aviation Rulemaking
Advisory Committee

MAR 15 2000

Mr. Craig Bolt
Assistant Chair, Transport Airplanes
and Engines Issues Group
400 Main Street
East Hartford, CT 06108

Dear Mr. Bolt:

This letter acknowledges receipt of the following working group technical reports that you have submitted on behalf of the Aviation Rulemaking Advisory Committee (ARAC) on Transport Airplane and Engine Issues (TAE):

Date of Letter	Task No.	Description of Recommendation	Working Group
12/14/00	1, 2, 3	Fast track reports addressing §§ 25.703(a) thru (c) (takeoff warning system); 25.1333(b) (instrument systems; and 25.1423(b) (public address system)	ASHWG
12/17/00	5	Fast track reports addressing §§ 25.111(c)(4), 25.147, controllability in 1-engine inoperative condition; 25.161 (c) (2) and (4), and (e) (longitudinal trim and airplanes with 4 or more engines) 25.175(d) (static longitudinal stability; 25.177(a)(b) (static lateral-directional stability); 25.253(a)(3) (high speed characteristics); 25.1323(c) (airspeed indicating system); 25.1516 (landing gear speeds); 25.1527 (maximum operating altitude); 25.1583(c) and (f) operating limitations) 25.1585 (operating procedures); and 25.1587 (performance information)	FTHWG
12/17/00	7	Fast track report addressing § 25.903(e) (inflight engine failures)	PPIHWG

12/20/00	5	Fast track reports addressing §§ 25.1103 (auxiliary power units); 25.933(a) (thrust reverers); 25.1189 (shutoff means); 25.1141 (powerplant controls); 25.1093 (air intake/induction systems); 25.1091 (air intake system icing protection; 25.943 (thrust reverser system tests); 25.934 (negative acceleration); 25.905(d) (propeller blade debris); 25.903(d)(1) (engine case burn-through); 25.901(d) (auxiliary power unit installation; and 1.1 (general definitions)	PPIHWG
12/20/00	4	Fast track report, category 2 format--NRRM addressing § 25.302 and appendix K (interaction of systems and structures	LDHWG
12/20/00	2	Fast track report—(in NPRM/AC format) addressing §§ 25.361 and 25.362 (engine and auxiliary power unit load conditions)	LDHWG
12/20/00	1	Fast track report addressing § 25.1438 (pressurization and low pressure pneumatic systems)	MSHWG

The above listed reports will be forwarded to the Transport Airplane Directorate for review. The Federal Aviation Administration's (FAA) progress will be reported at the TAE meetings.

This letter also acknowledges receipt of your July 28, 1999, submittal which included proposed notices and advisory material addressing lightning protection. We apologize for the delay. Although the lightning protection task is not covered under the fast track proposal, the FAA recognizes that technical agreement has been reached and we will process the package accordingly. The package has been sent to Aircraft Certification for review; the working group will be kept informed of its progress through the FAA representative assigned to the group.

Lastly, at the December 8 - 9, 1999, TAE meeting, Mr. Phil Salee of the Powerplant Installation Harmonization Working Group indicated that the working group members agreed that § 25.1103 was sufficiently harmonized and that any further action was beyond the scope of task 8 assigned. We agreed with the TAE membership to close the task. This letter confirms the FAA's action to close the task to harmonize § 25.1103.

I would like to thank the ARAC, particularly those members associated with TAE for its cooperation in using the fast track process and completing the working group reports in a timely manner.

Sincerely,

ORGINIAL SIGNED BY
ANTHONY F. FAZIO

Tony F. Fazio
Director, Office of Rulemaking

ARM-209:EUpshaw:fs:6/27/00:PCDOCS #12756v1
cc: ARM-1/20/200/209; APO-300/320, ANM-114
File #1340.12

File #ANM-98-182-A (landing gear shock absorption test requirements) and ANM-94-461-A (Taxi, takeoff, and landing roll design loads)

Recommendation

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. ; Notice No.]

RIN: 2120-

Interaction of Systems and Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes to revise the design standards for transport category airplanes equipped with systems that directly or as a result of a failure or malfunction would affect the structural performance of the airplane. This action would incorporate into the regulations the latest criteria developed for special conditions used in the certification of airplanes equipped with fly-by-wire and active flight control systems. This action would also relieve a burden on industry by eliminating differences between the Federal Aviation Regulations (FAR) and European Joint Airworthiness Regulations (JAR).

DATES: Comments must be received on or before [insert date 90 days after date of publication in the Federal Register].

ADDRESS: 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. , 800 Independence Avenue SW., Washington DC 20591; or delivered in triplicate to: Room 915G, 800 Independence Avenue SW., Washington, DC 20591. Comments delivered must be marked: Docket No. . Comments may also be submitted electronically to nprmcmts@mail.hq.faa.gov. Comments may be examined in room 915G weekdays, except Federal holidays, between 8:30 a.m. and 5:00 p.m. 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 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: James Haynes, FAA Airframe and Propulsion Branch (ANM-112), Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, WA 98055-4056; telephone (206) 227-2131.

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. Comments relating to the environmental, energy or economic impact that might result from adoption of proposals contained in this notice are invited. Substantive comments should be accompanied by cost estimates. Commenters should identify the regulatory docket or notice number and submit comments in triplicate to the Rules Docket addressed specified above. All comments will be considered by the Administrator before taking action on the proposed rulemaking. The proposals contained in this notice may be changed in light of 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. ." The postcard will be date/time stamped and returned to the commenter.

Availability of the 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 Federal Register's electronic bulletin board service (telephone: 202-512-1661), or the FAA's Aviation Rulemaking Advisory Committee Bulletin Board service (telephone: 202-267-5984).

Internet users may reach the FAA's web page at http://www.faa.gov or the Federal Register's web page at http://www.access.gpo/su_docs for access to recently published rulemaking documents.

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, D.C. 20591, or by calling (202) 267-9680. Communications must identify the 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 procedures.

Background

Active flight control systems are capable of providing automatic responses to external inputs from sources other than the pilots. Active flight control systems have been expanded in function, effectiveness, and reliability to the point that fly-by-wire flight controls, without a manual backup system in the event of system failures, are becoming standard equipment on larger transport airplanes. As a result of these advancements in flight controls technology, the current safety standards contained in 14 CFR part 25 do not provide an adequate basis to address an acceptable level of safety for airplanes equipped with these advanced systems. Instead, certification of these systems has been achieved by issuance of special conditions under the provisions of 14 CFR section 21.16.

For example, stability augmentation systems (SAS), and to a lessor extent load alleviation systems (LAS), have been used on transport airplanes for many years. Past approvals of these systems were based on individual findings of equivalent level of safety with existing rules and on special conditions. An advisory circular (AC 25.672-1) was issued November 11, 1983 that provided an equivalent means of compliance under the provisions of § 21.21(b)(1) for SAS, LAS, flutter control systems (FCS), another type of active control system.

Although autopilots are also considered active control systems, typically their control authority has been limited such that the consequences of system failures could be readily counteracted by the pilot. Now, autopilot functions are integrated into the primary flight controls and are given sufficient control authority to maneuver the airplane to its structural design limits. This advanced technology with its expanded authority requires a new approach to account for the interaction of control systems and structures.

The usual deterministic approach to defining the loads envelope contained in part 25 does not fully account for system effectiveness and system reliability. These automatic systems may be inoperative or may operate in a degraded mode with less than full system authority. Therefore, it is necessary to determine the structural factors of safety and operating margins such that the joint probability of structural failures due to application of loads during system malfunctions is not greater than that found in airplanes equipped with earlier technology control systems. To achieve this objective it is necessary to define the failure conditions with their associated frequency of occurrence in order to determine the structural factors of safety and operating margins that will ensure an acceptable level of safety.

Earlier automatic control systems usually provided two states, either fully functioning or a total loss of function. These conditions were readily detected by the flightcrew. The new active flight control systems have failure modes that allow the system to function in the degraded mode without full authority. This degraded mode is not readily detectable by the flightcrew. Therefore, monitoring systems are required on these new systems to provide an annunciation of a condition of degraded system capability.

In 1988, the FAA, in cooperation with the JAA and organizations representing the U.S. and European aerospace industries, began a process to harmonize the airworthiness requirements of the United States and the airworthiness requirements of the European authorities. The objective was to achieve common requirements for the certification of transport airplanes without a substantive change in the level of safety. Other airworthiness authorities such as Transport Canada also participated in this process.

In 1992, the harmonization effort was undertaken by the Aviation Regulatory Advisory Committee (ARAC). By notice in the Federal Register (58 FR 13819, March 15, 1993), the FAA chartered a working group of industry and government structural specialists of Europe, the U.S., and Canada. The harmonization effort has now progressed to the point that some specific proposals have been developed by the working group for the interaction of systems and structures requirements of part 25. These proposals have been adopted by ARAC and recommended to the FAA by letter dated [insert date submitted to the FAA]. This notice

contains the proposals necessary to achieve harmonization of the interaction of systems and structures requirements of part 25.

In this proposed revision, and in the current standards and regulations, the term "any" is used. Use of this term has traditionally been understood to require the applicant to address all items covered by the term, rather than addressing only a portion of the items. The use of the term "any" in this amendment continues this traditional understanding.

Discussion

This notice proposes to incorporate the safety requirements found necessary for airplanes equipped with active flight controls and fly-by-wire flight control systems except that the general philosophy of accounting for the impact of system failures on structural performance would be extended to include any system whose partial or complete failure, alone or in combination with other system partial or complete failures, would affect structural performance. The required structural factors of safety would be defined as a function of system reliability. This is an extension of the current philosophy that the airplane should be capable of continued safe flight and landing after specific failure events not shown to be extremely improbable.

Paragraph (e) of this proposal provides for the consideration of expected operational limits in the establishment of the appropriate safety factors. These limits are the expected maximum limits for dispatch in the failure condition and would be established consistent with experience on similar equipment in service.

In addition to providing requirements for static strength this notice proposes requirements that account for the effects of system failures on fatigue, damage tolerance, residual strength, deformation and aeroelastic stability. The impact of all combinations of system failures not shown to be extremely improbable need to be investigated.

This action should not have a significant economic impact on the manufacturers of new airplanes since it incorporates the criteria already applied by special conditions to new technology airplanes. Nor would it place a significant design burden on the applicant because there are many design options available including conventional control systems. This proposal would add a new

§ 25.302 and a new Appendix K to part 25 to incorporate these latest safety standards. It would also amend §§ 25.305 and 25.629 to make these rules compatible with the new § 25.302 rule.

Regulatory Evaluation Summary

Regulatory Evaluation Summary. Regulatory Flexibility Determination. and Trade Impact Assessment

Changes to federal regulations must undergo several economic analyses. First, Executive Order 12866 directs Federal agencies to promulgate new regulations or modify existing regulations only if the potential benefits to society outweigh the potential costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these assessments, the FAA has determined that this proposed rule: (1) would generate benefits exceeding its costs and is not "significant" as defined in Executive Order 12866; (2) is not "significant" as defined in DOT's Policies and Procedures; (3) would not have a significant impact on a substantial number of small entities; and (4) would lessen restraints on international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary

The proposed requirements would apply to future type certificated transport category airplanes and would not impose additional costs on manufacturers. The latest criteria developed for recent special conditions for fly-by-wire and active flight control systems would be incorporated into the FAR. The special conditions contain safety standards necessary to maintain a level of safety equivalent to that established in the FAR. Special conditions are never used as a means to increase the level of safety above that described by the certification basis of the airplane or product. Where special conditions are necessary in order to certify a product, it is not incumbent on the FAA to assess their cost-effectiveness. The cost-effectiveness of a novel or unique design is the responsibility of the applicant and is implicit in the applicant's design decision. Furthermore, it is unlikely that a unique design would become industry practice unless industry deemed it cost effective.

One manufacturer of part 25 small airplanes is concerned that, in order to prevent risk of new loads impacting a new type certification program in the test phase, it would have to make conservative assumptions on the Appendix K factors or extend the program to allow a design iteration which includes actual factors generated from known system failure probabilities. The FAA maintains that the current regulations already require system safety analyses that estimate system failure probabilities. The same manufacturer states that Appendix K would increase airplane weight. The FAA believes that compliance with Appendix K should result in a lighter airplane. The manufacturer also contends that it and other manufacturers currently provide the intent of proposed § 25.302 through compliance with the existing FAR. The FAA disagrees with this interpretation. Under the current regulations, in order to take advantage of any loads relief provided by any active control system, it is necessary to comply with either special conditions or findings of equivalent safety. In either case, compliance with standards equivalent to Appendix K would be required. There are no current part 25 regulations that provide the intent of § 25.302 unless supplemented with equivalent safety standards.

Another manufacturer of part 25 small airplanes indicates that the requirements of proposed Appendix K seem to also pertain to older mechanical systems and therefore may impose additional costs. The FAA notes that the proposed Appendix K requirements pertaining to such systems essentially reflect those of current §§ 25.671 (Control Systems, General) and 25.672 (Stability augmentation and automatic and power-operated systems), as well as those of §§ 25.1309 (Equipment, systems, and installations) and 25.1329 (Automatic pilot system). Consequently, no new costs would be imposed with respect to certification of mechanical systems.

Finally, by harmonizing the standards of the FAR and JAR, the proposed rule would yield cost savings by eliminating duplicate certification activities. One manufacturer of part 25 large airplanes estimates potential cost-savings of approximately $80,000 per type certification. Increased efficiency from codification of the proposed requirements, as opposed to continued reliance on special conditions, would supplement these benefits.

Based on the finding of no incremental costs imposed, coupled with the cost savings realizable from harmonization, the FAA has determined that the proposed rule is cost-beneficial.

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 agencies to determine whether rules would have "a significant economic impact on a substantial number of small entities." FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, prescribes standards for complying with RFA requirements in FAA rulemaking actions. The Order defines "small entities" in terms of size thresholds, "significant economic impact" in terms of annualized cost thresholds, and "substantial number" as a number which is not less than eleven and which is more than one-third of the affected small entities.

The proposed rule would affect manufacturers of transport category airplanes produced under future new airplane type certifications. For airplane manufacturers, FAA Order 2100.14A specifies a size threshold for classification as a small entity as 75 or fewer employees. Since no part 25 airplane manufacturer has 75 or fewer employees, the proposed rule would not have a significant economic impact on a substantial number of small airplane manufacturers.

International Trade Impact Assessment

The proposed rule would have no adverse impact on trade opportunities for U.S. manufacturers selling airplanes in foreign markets and foreign manufacturers selling airplanes in the U.S. market. Instead, by harmonizing the standards of the FAR and the JAR, it would lessen restraints on trade.

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.

International Compatibility

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

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1980 (Pub. L. 96-511), there are no requirements for information collection associated with this proposed rule.

Conclusion

Because the proposed changes to the loads requirements are not expected to result in substantial economic cost, the FAA has determined that this proposed rule would not be significant under Executive Order 12866. Because this is an issue that has not prompted a great deal of public concern, the FAA has determined that this action is not significant as defined in Department of Transportation Regulatory Policies and Procedures (44 FR 11034, February 25, 1979). In addition, since there are no small entities affected by this proposed rulemaking, the FAA certifies, under the criteria of the Regulatory Flexibility Act, that this proposed rule, if adopted, would not have a significant economic impact, positive or negative, on a substantial number of small entities. An initial regulatory evaluation of the proposed rule, including a Regulatory Flexibility determination and Trade Impact Analysis, has been placed in the docket. A copy may be obtained by contacting the person identified under the caption "FOR FURTHER INFORMATION CONTACT."

List of Subjects in 14 CFR part 25

Aircraft, Aviation safety, Reporting and Record keeping requirements.

The Proposed Amendments

Accordingly, the Federal Aviation Administration (FAA) proposes to amend 14 CFR part 25 of the Federal Aviation Regulations (FAR) as follows:

PART 25-AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. The authority citation of Part 25 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

2. By adding a new paragraph § 25.302 to read as follows:

§ 25.302 Interaction of systems and structures.

For airplanes equipped with systems that affect structural performance, either directly or as a result of a failure or malfunction, the influence of these systems and their failure conditions must be taken into account when showing compliance with the requirements of Subparts C and D. Appendix K of this part must be used to evaluate the structural performance of airplanes equipped with these systems.

3. By adding a new Appendix K to read as follows:

APPENDIX K TO PART 25 - INTERACTION OF SYSTEMS AND STRUCTURES

K25.1 General.

The following criteria must be used for showing compliance with § 25.302 for airplanes equipped with flight control systems, autopilots, stability augmentation systems, load alleviation systems, flutter control systems, and fuel management systems. If this appendix is used for other systems, it may be necessary to adapt the criteria to the specific system.

(a) The criteria defined herein only address the direct structural consequences of the system responses and performances and cannot be considered in isolation but should be included in the overall safety evaluation of the airplane. These criteria may in some instances duplicate standards already established for this evaluation. These criteria are only applicable to structure whose failure could prevent continued safe flight and landing. Specific criteria that define acceptable limits on handling characteristics or stability requirements when operating in the system degraded or inoperative mode are not provided in this appendix.

(b) Depending upon the specific characteristics of the airplane, additional studies may be required that go beyond the criteria provided in this appendix in order to demonstrate the capability of the airplane to meet other realistic conditions such as alternative gust or maneuver descriptions for an airplane equipped with a load alleviation system.

(c) The following definitions are applicable to this appendix.

Structural performance: Capability of the airplane to meet the structural requirements of Part 25.

Flight limitations: Limitations that can be applied to the airplane flight conditions following an in-flight occurrence and that are included in the flight manual (e.g., speed limitations, avoidance of severe weather conditions, etc.).

Operational limitations: Limitations, including flight limitations, that can be applied to the airplane operating conditions before dispatch (e.g., fuel, payload and Master Minimum Equipment List limitations).

Probabilistic terms: The probabilistic terms (probable, improbable, extremely improbable) used in this appendix are the same as those used in § 25.1309.

Failure condition: The term failure condition is the same as that used in § 25.1309, however this appendix applies only to system failure conditions that affect the structural performance of the airplane (e.g., system failure conditions that induce loads, change the response of the airplane to inputs such as gusts or pilot actions, or lower flutter margins).

K25.2 Effects of Systems on Structures.

(a) General. The following criteria will be used in determining the influence of a system and its failure conditions on the airplane structure.

(b) System fully operative. With the system fully operative, the following apply:

(1) Limit loads must be derived in all normal operating configurations of the system from all the limit conditions specified in Subpart C, taking into account any special behavior of such a system or associated functions or any effect on the structural performance of the airplane that may occur up to the limit loads. In particular, any significant nonlinearity (rate of displacement of control surface, thresholds or any other system nonlinearities) must be accounted for in a realistic or conservative way when deriving limit loads from limit conditions.

(2) The airplane must meet the strength requirements of part 25 (Static strength, residual strength), using the specified factors to derive ultimate loads from the limit loads defined above. The effect of nonlinearities must be investigated beyond limit conditions to ensure the behavior of the system presents no anomaly compared to the behavior below limit conditions. However, conditions beyond limit conditions need not be considered when it can be shown that the airplane has design features that will not allow it to exceed those limit conditions.

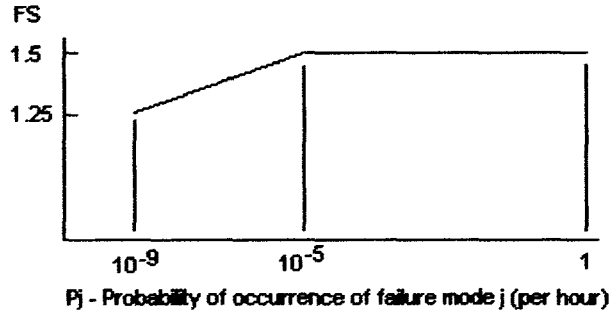
(3) The airplane must meet the aeroelastic stability requirements of § 25.629.

(c) System in the failure condition. For any system failure condition not shown to be extremely improbable, the following apply:

(1) At the time of occurrence. Starting from 1-g level flight conditions, a realistic scenario, including pilot corrective actions, must be established to determine the loads occurring at the time of failure and immediately after failure.

(i) For static strength substantiation, these loads multiplied by an appropriate factor of safety that is related to the probability of occurrence of the failure are ultimate loads to be considered for design. The factor of safety (F.S.) is defined in Figure 1.

Figure 1
factor of safety at the time of occurrence



(ii) For residual strength substantiation, the airplane must be able to withstand two thirds of the ultimate loads defined in subparagraph (c)(1)(i).

(iii) Freedom from aeroelastic instability must be shown up to the speeds defined in § 25.629(b)(2). For failure conditions that result in speed increases beyond V_C/M_C, freedom

from aeroelastic instability must be shown to increased speeds, so that the margins intended by § 25.629(b)(2) are maintained.

(iv) Failures of the system that result in forced structural vibrations (oscillatory failures) must not produce loads that could result in detrimental deformation of primary structure.

(2) For the continuation of the flight. For the airplane, in the system failed state and considering any appropriate reconfiguration and flight limitations, the following apply:

(i) The loads derived from the following conditions at speeds up to Vc, or the speed limitation prescribed for the remainder of the flight must be determined:

(A) the limit symmetrical maneuvering conditions specified in § 25.331 and in § 25.345.

(B) the limit gust and turbulence conditions specified in § 25.341 and in § 25.345.

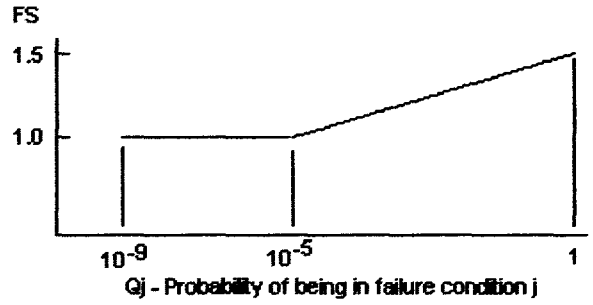
(C) the limit rolling conditions specified in § 25.349 and the limit unsymmetrical conditions specified in § 25.367 and § 25.427(b) and (c).

(D) the limit yaw maneuvering conditions specified in § 25.351.

(E) the limit ground loading conditions specified in § 25.473 and § 25.491.

(ii) For static strength substantiation, each part of the structure must be able to withstand the loads in subparagraph (2)(i) of this paragraph multiplied by a factor of safety depending on the probability of being in this failure state. The factor of safety is defined in Figure 2.

Figure 2
Factor of safety for continuation of flight



$Q_j = (T_j)(P_j)$ where:

T_j = Average time spent in failure condition j (in hours)

P_j = Probability of occurrence of failure mode j (per hour)

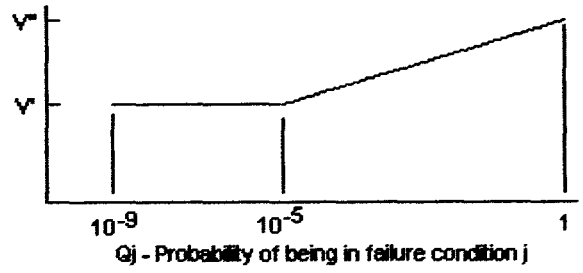
Note: If P_j is greater than 10^{-3}, per flight hour then a 1.5 factor of safety must be applied to all limit load conditions specified in Subpart C.

(iii) For residual strength substantiation, the airplane must be able to withstand two thirds of the ultimate loads defined in subparagraph (c) (2) (ii).

(iv) If the loads induced by the failure condition have a significant effect on fatigue or damage tolerance then their effects must be taken into account.

(v) Freedom from aeroelastic instability must be shown up to a speed determined from Figure 3. Flutter clearance speeds V' and V" may be based on the speed limitation specified for the remainder of the flight using the margins defined by § 25.629(b).

Figure 3
Clearance speed



V' = Clearance speed as defined by § 25.629(b)(2).

V" = Clearance speed as defined by § 25.629(b)(1).

$Q_j = (T_j)(P_j)$ where:

T_j = Average time spent in failure condition j (in hours)

P_j = Probability of occurrence of failure mode j (per hour)

Note: If P_j is greater than 10^{-3} per flight hour, then the flutter clearance speed must not be less than V".

(vi) Freedom from aeroelastic instability must also be shown up to V' in Figure 3 above, for any probable system failure condition combined with any damage required or selected for investigation by § 25.571(b).

(3) Consideration of certain failure conditions may be required by other Sections of this Part regardless of calculated system reliability. Where analysis shows the probability of these failure conditions to be less than 10^{-9}, criteria other than those specified in this paragraph may be used for structural substantiation to show continued safe flight and landing.

(d) Warning considerations. For system failure detection and warning, the following apply:

(1). The system must be checked for failure conditions, not extremely improbable, that degrade the structural capability below the level required by part 25 or significantly reduce the reliability of the remaining system. The flight crew must be made aware of these failures before flight. Certain elements of the control system, such as mechanical and hydraulic components, may use special periodic inspections, and electronic components may use daily checks, in lieu of warning systems to achieve the objective of this requirement. These certification maintenance requirements must be limited to components that are not readily detectable by normal warning systems and where service history shows that inspections will provide an adequate level of safety.

(2). The existence of any failure condition, not extremely improbable, during flight that could significantly affect the structural capability of the airplane and for which the associated reduction in airworthiness can be minimized by suitable flight limitations, must be signaled to the flightcrew. For example, failure conditions that result in a factor of safety between the airplane strength and the loads of Subpart C below 1.25, or flutter margins below V", must be signaled to the crew during flight.

e) Dispatch with known failure conditions. If the airplane is to be dispatched in a known system failure condition that affects structural performance, or affects the reliability of the remaining system to maintain structural performance, then the provisions of § 25.302 must be met for the dispatched condition and for subsequent failures. Flight limitations and expected operational limitations may be taken into account in establishing Qj as the combined probability of being in the dispatched failure condition and the subsequent failure condition for the safety margins in Figures 2 and 3. These limitations must be such that the probability of being in this combined failure state and then subsequently encountering limit load conditions is extremely improbable. No reduction in these safety margins is allowed if the subsequent system failure rate is greater than 1E-3 per hour.

4. By amending § 25.305 by revising paragraph (f) to read as follows:

§ 25.305 Strength and deformation.

* * * * *

(f) Unless shown to be extremely improbable, the airplane must be designed to withstand any forced structural vibration resulting from any failure, malfunction or adverse condition in the flight control system. These loads must be treated in accordance with the requirements of § 25.302.

5. By amending § 25.629 by revising paragraphs (a), (c), and (d)(2) and by adding a new paragraph (b)(3) to read as follows:

§ 25.629 Aeroelastic stability requirements.

(a) General. The aeroelastic stability evaluations required under this section include flutter, divergence, control reversal and any undue loss of stability and control as a result of structural deformation. The aeroelastic evaluation must include whirl modes associated with any propeller or rotating device that contributes significant dynamic forces. Compliance with this section must be shown by analysis, tests, or some combination thereof as found necessary by the Administrator.

(b) * * * *

(3) For failure conditions in those systems covered by § 25.302, the margins defined in Appendix K of this part apply.

(c) Balance weights. If balance weights are used, their effectiveness and strength, including supporting structure, must be substantiated.

(d) * * * *

(2) Any single failure in any flutter damper or flutter control system.

Issued in Washington DC., on

DC/Interact.doc

Rules and Regulations

Federal Register
Vol. 79, No. 191
Thursday, October 2, 2014

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No.: FAA–2013–0109; Amdt. No. 25–139]

RIN 2120–AK13

Harmonization of Airworthiness Standards—Miscellaneous Structures Requirements

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This final rule amends certain airworthiness regulations for transport category airplanes, based on recommendations from the FAA-sponsored Aviation Rulemaking Advisory Committee (ARAC). This amendment eliminates regulatory differences between the airworthiness standards of the FAA and the European Aviation Safety Agency (EASA). This final rule does not add new requirements beyond what manufacturers currently meet for EASA certification and does not affect current industry design practices. This final rule revises the structural test requirements necessary when analysis has not been found reliable; clarifies the quality control, inspection, and testing requirements for critical and non-critical castings; adds control system requirements that consider structural deflection and vibration loads; expands the fuel tank structural and system requirements regarding emergency landing conditions and landing gear failure conditions; adds a requirement that engine mount failure due to overload must not cause hazardous fuel spillage; and revises the inertia forces requirements for cargo compartments by removing the exclusion of compartments located below or forward of all occupants in the airplane.

DATES: Effective December 1, 2014.

ADDRESSES: For information on where to obtain copies of rulemaking documents and other information related to this final rule, see ''How to Obtain Additional Information'' in the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: For technical questions concerning this action, contact Todd Martin, Airframe and Cabin Safety Branch, ANM–115, Transport Airplane Directorate, Aircraft Certification Service, Federal Aviation Administration, 1601 Lind Avenue SW., Renton, WA 98057–3356; telephone (425) 227–1178; facsimile (425) 227–1232; email *Todd.Martin@faa.gov.*

For legal questions concerning this action, contact Sean Howe, Office of the Regional Counsel, ANM–7, Federal Aviation Administration, 1601 Lind Avenue SW., Renton, Washington 98057–3356; telephone (425) 227–2591; facsimile (425) 227–1007; email *Sean.Howe@faa.gov.*

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, ''General Requirements.'' Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing regulations and minimum standards for the design and performance of aircraft that the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority. It prescribes new safety standards for the design of transport category airplanes.

I. Overview of Final Rule

The FAA is amending Title 14, Code of Federal Regulations (14 CFR) 25.307(a), 25.621, 25.683, 25.721, 25.787(a), 25.963(d), and 25.994 as described below. This action harmonizes part 25 requirements with the corresponding requirements in Book 1 of the EASA Certification Specifications and Acceptable Means of Compliance for Large Aeroplanes (CS–25).

1. Section 25.307(a), ''Proof of structure,'' currently requires structural strength testing, unless the applicant has demonstrated that analysis alone is reliable. Paragraph (a) is revised to clarify the load levels to which testing is required, when such testing is required.

2. Section 25.621, ''Casting factors,'' is revised to clarify the quality control, inspection, and testing requirements for critical and non-critical castings.

3. Section 25.683, ''Operation tests,'' is revised to add a requirement that—

- The control system must remain free from jamming, friction, disconnection, and permanent damage in the presence of structural deflection and
- Under vibration loads, no hazard may result from interference or contact of the control system with adjacent elements.

4. Section 25.721, ''Landing Gear—General,'' is revised to—

- Expand the landing gear failure conditions to include side loads, in addition to up and aft loads, and expand this requirement to include nose landing gear in addition to the main landing gear,
- Specify that the wheels-up landing conditions are assumed to occur at a descent rate of 5 feet per second,
- Add a sliding-on-ground condition, and
- Require the engine mount be designed so that, when it fails due to overload, this failure does not cause the spillage of enough fuel to constitute a fire hazard.

5. Section 25.787, ''Stowage compartments,'' is revised to expand the inertia forces requirements for cargo compartments by removing the exclusion of compartments located below or forward of all occupants in the airplane.

6. Section 25.963, ''Fuel tanks: general,'' is revised to—

- Require that fuel tanks be designed so that no fuel is released in or near the fuselage, or near the engines, in quantities that would constitute a fire hazard in otherwise survivable emergency landing conditions,
- Define fuel tank pressure loads for fuel tanks located within and outside the fuselage pressure boundary and near the fuselage or near the engines, and

• Specify the wheels-up landing conditions and landing gear and engine mount failure conditions that must be considered when evaluating fuel tank structural integrity.

7. Section 25.994, ''Fuel system components,'' is revised to specify the wheels-up landing conditions to be considered when evaluating fuel system components.

II. Background

A. Statement of the Problem

Part 25 of 14 CFR prescribes airworthiness standards for type certification of transport category airplanes, for products certified in the United States. EASA CS–25 Book 1 prescribes the corresponding airworthiness standards for products certified in Europe. While part 25 and CS–25 Book 1 are similar, they differ in several respects. To resolve those differences, the FAA tasked ARAC through the Loads and Dynamics Harmonization Working Group (LDHWG) and the General Structures Harmonization Working Group (GSHWG) to review existing structures regulations and recommend changes that would eliminate differences between the U.S. and European airworthiness standards. The LDHWG and GSHWG developed recommendations, which EASA has incorporated into CS–25 with some changes. The FAA agrees with the ARAC recommendations as adopted by EASA, and this final rule amends part 25 accordingly.

B. Summary of the NPRM

On February 14, 2013, the FAA issued a Notice of Proposed Rulemaking (NPRM), Notice No. 25–137, Docket No. FAA–2013–0109, to amend §§ 25.307(a), 25.621, 25.683, 25.721, 25.787(a), 25.963(d), and 25.994. That NPRM was published in the **Federal Register** on March 1, 2013 (78 FR 13835). (The NPRM Notice No. was corrected to ''13–03'' in the **Federal Register** on April 16, 2014 (79 FR 21413)). In the NPRM, the FAA proposed to (1) revise the structural test requirements necessary when analysis has not been found reliable; (2) clarify the quality control, inspection, and testing requirements for critical and non-critical castings; (3) add control system requirements that consider structural deflection and vibration loads; (4) expand the fuel tank structural and system requirements regarding emergency landing conditions and landing gear failure conditions; (5) add a requirement that engine mount failure due to overload must not cause hazardous fuel spillage; and (6) revise the inertial forces requirements for cargo compartments by removing the exclusion of compartments located below or forward of all occupants in the airplane. The FAA proposed these changes to eliminate regulatory differences between the airworthiness standards of the FAA and EASA. The NPRM comment period closed on May 30, 2013.

C. General Overview of Comments

The FAA received 16 comments from 5 commenters. All commenters generally support the proposal, but they suggested changes discussed more fully below. The FAA received comments on each of the sections being changed, as follows:

- Section 25.307(a)—four comments
- Section 25.621—four comments
- Section 25.683—one comment
- Section 25.721—one comment
- Section 25.787(a)—two comments
- Section 25.963(d)—three comments
- Section 25.994—one comment

III. Discussion of Public Comments and Final Rule

A. Section 25.307, Proof of Structure

In the NPRM, the FAA proposed revising paragraph (a) of § 25.307 to require that, when structural analysis has not been shown to be reliable, substantiating tests must be made to load levels that are sufficient to verify structural behavior up to limit and ultimate loads of § 25.305.

One commenter stated that § 25.305 includes both limit and ultimate loads, so it is unclear which ''loads'' were intended by this change. More importantly, ''up to'' could mean any load level below limit or below ultimate and as such is indefinite. For example, an applicant could choose a load level of 10 percent of limit load and be in compliance with the proposed rule. The commenter proposed changing ''up to loads specified in § 25.305'' to ''at least limit load as specified in § 25.305.''

The FAA believes the wording proposed in the NPRM is correct, and no change is necessary. The phrase ''up to'' does not apply to the test load level; it applies to the design load level—the loads specified in § 25.305, including ultimate loads—which must be verified. The intent of the rule is that, when analysis has not been shown to be reliable, tests must be conducted to ''sufficient'' load levels. Normally, testing to ultimate load levels is required, but when previous relevant test evidence can be used to support the analysis, a lower level of testing may be accepted. The rule allows this intermediate level of testing. Advisory Circular (AC) 25.307–1, ''Proof of Structure,'' which the FAA is issuing concurrently with the final rule, provides detailed guidance on means of compliance with the rule.

Another commenter recommended changing the word ''reliable'' in the proposed rule to ''dependable and conservative.'' The term ''reliable'' has been in place since this rule was originally published in 1965. As stated in the NPRM, while the rule has changed, the rule intent remains the same. We believe ''reliable'' is appropriate and clear, and no change is necessary.

The same commenter also recommended noting that, where justified, test load levels may be less than ultimate. We do not believe this change is necessary because it is already expressed in the rule that substantiating tests must be made to load levels that are sufficient to verify structural behavior up to loads specified in § 25.305.

The same commenter also recommended the FAA add further explanation about the absolute need to validate models and when lack of validation might be acceptable. We do not believe it is necessary to revise the rule to address validation, since that subject relates to the acceptability of an applicant's showing of compliance rather than to the airworthiness standard itself. This subject is thoroughly addressed in the accompanying AC 25.307–1. We have not revised the final rule in this regard.

B. Section 25.621, Casting Factors

With this rulemaking, the FAA clarifies ''critical castings'' as each casting whose failure could preclude continued safe flight and landing of the airplane or could result in serious injury to occupants. One commenter agreed that improved foundry methods have resulted in higher quality castings but not to the point where a casting factor less than 1.25 is justified. The commenter recommended to either (1) eliminate the option for casting factors of 1.0 for critical castings, or (2) ensure that the characterization of material properties that are equivalent to those of wrought alloy products of similar composition includes the effect of defects in the static strength, fatigue, and damage tolerance requirements. The commenter provided the following examples of defects that could affect material properties: shell defects, hard-alpha contamination, shrink, porosity, weld defects, grain size, hot tears, incomplete densifications, and prior particle boundaries, among others.

The FAA does not agree with the commenter's first recommendation to eliminate the option for using a casting factor of 1.0 for critical castings. The criteria specified in the final rule will ensure product quality that is sufficient to justify using a casting factor of 1.0. According to the rule, to qualify for a casting factor of 1.0, the applicant must demonstrate, through process qualification, proof of product, and process monitoring, that the casting has coefficients of variation of the material properties that are equivalent to those of wrought alloy products of similar composition. The rule requires process monitoring that includes testing of coupons and, on a sampling basis, coupons cut from critical areas of production castings. In addition, the applicant must inspect 100 percent of the casting surface of each casting, as well as structurally significant internal areas and areas where defects are likely to occur. The applicant must also test one casting to limit and ultimate loads. The purpose of the minimum casting factor of 1.25 in the current rule is to increase the strength of the casting to account for variability in the casting process. In the final rule, the additional process, inspection, and test requirements required to use a casting factor less than 1.25 ensure a more consistent product and maintain the same level of safety as the existing standards. AC 25.621–1, ''Casting Factors,'' provides detailed guidance on the premium casting process necessary to allow a casting factor of 1.0, and the FAA is issuing that AC concurrently with this final rule.

The FAA partially agrees with the commenter's second recommendation, which is to ensure that the characterization of material properties that are equivalent to those of wrought alloy products of similar composition includes the effect of defects in the static strength, fatigue, and damage tolerance requirements. The rule requires that the characterization of material properties includes the effect of defects with regard to static strength. If any type of defect is discovered during process qualification, proof of product, or process monitoring, or by any inspection or static strength test, such that the coefficients of variation of the material properties are not equivalent to those of wrought alloy products of similar composition, then that casting would not qualify for a casting factor of 1.0. These defects include each of the examples identified by the commenter, as well as any other type of defect that could affect material properties. In addition, as noted previously, AC 25.621–1, which the FAA is issuing concurrently with the final rule, provides detailed guidance on the premium casting process necessary to allow a casting factor of 1.0. The AC includes reference to and addresses defects as proposed by the commenter.

We do not, however, agree that the characterization of material properties to determine the appropriate casting factor should include the effect of defects on fatigue and damage tolerance properties. Since casting factors apply only to strength requirements, rather than fatigue and damage tolerance requirements, the comparison of cast material to wrought material should only be based on material strength properties, rather than fatigue and damage tolerance characteristics.

Section 25.621(c)(2)(ii)(B) specifies a factor of 1.15 be applied to limit load test values to allow an applicant to use a casting factor of 1.25. Section 25.621(c)(3)(ii)(B) also specifies a factor of 1.15 be applied to limit load test values to allow a casting factor of 1.5. One commenter recommended that the 1.15 test factor in § 25.621(c)(3)(ii)(B) be scaled up by a factor of 1.2 (1.5/1.25), so as to align with the corresponding ultimate requirement. The 1.15 limit load test factor in § 25.621(c)(3)(ii)(B) would then be 1.38 (i.e., $1.5/1.25 \times 1.15$; 1.15 being required already in conjunction with the 1.25 casting factor for ultimate).

The FAA does not agree that for critical castings with a casting factor of 1.25 or 1.5, the limit load test factor should be linked to the ultimate load test factor. The ultimate and limit load tests have different purposes. The ultimate load test confirms ultimate load capability, while the limit load test confirms that no deformation will occur up to a much lower load level. Therefore, we see no reason to link the two test factors, and we believe the 1.15 factor specified in § 25.621(c)(3)(ii)(B) is appropriate, as recommended by ARAC and as currently specified in EASA CS 25.621.

The same commenter recommended modifying § 25.621(c) by adding a reference to § 25.305 for clarity—that each critical casting must have a factor associated with it for showing compliance with the strength and deformation requirement ''of § 25.305.'' We agree and have revised the final rule as recommended.

The same commenter noted that § 25.621 only refers to static testing and does not include any requirements for fatigue testing. The commenter stated that critical castings should also comply with § 25.571 concerning fatigue and damage tolerance. The commenter recommended including information to remind manufacturers of this requirement. The FAA agrees with the commenter that § 25.571 applies to critical castings. We believe the current wording in § 25.571 and the new wording in § 25.621 is sufficiently clear on this point, and no changes to these requirements are necessary.

No other public comments were received on § 25.621. However, after further FAA review, we revised the rule in several places to specify ''visual inspection and liquid penetrant or equivalent inspection methods.'' This change is to clarify ''equivalent inspection methods'' refers to the liquid penetrant inspection, and not the visual inspection. Although there is some textual difference between this and CS 25.621, there is no substantive difference between the two harmonized rules.

C. Section 25.683, Operation Tests

A commenter noted that the control systems to which § 25.683(b) applies are those control systems that obtain the pitch, roll, and yaw limit maneuver loads of the airplane structure. For example, an applicant must take into account the elevator, rudder, and aileron because these control surfaces obtain the referenced maneuver loads, while high lift systems do not need to be considered under § 25.683(b). The commenter suggested that we clarify this in the preamble to the final rule. The FAA agrees and hereby clarifies that § 25.683 only applies to those control systems that are loaded to obtain the specified maneuver loads. No change to the final rule text is necessary.

No other public comments were received on § 25.683. We would like to explain what is meant by ''where necessary'' as used in § 25.683(b). The rule states: ''It must be shown by analysis and, *where necessary,* by tests, that in the presence of deflections of the airplane structure,'' the control system operates without jamming, excessive friction, or permanent damage. The FAA may accept analysis alone to comply with this requirement. However, the FAA or the applicant may determine that, in certain cases, some testing is necessary to verify the analysis. For example, some testing may be necessary if the structure or control system is significantly more complex than a previous design, or if the analysis shows areas where the control system could be susceptible to jamming, friction, disconnection or damage. Testing may include component testing or full-scale tests.

D. Section 25.721, Landing Gear—General

A commenter proposed to add a paragraph (d) to § 25.721 to state that the conditions in paragraphs (a) through (c) must be considered regardless of the corresponding probabilities. The FAA does not believe this addition is necessary. The various failure conditions in the rule are stated directly, and the FAA intended no implication that the probability of these failure conditions may be taken into account. However, because the FAA proposed that a failure mode *not be likely* to cause the spillage of enough fuel to constitute a fire hazard, the proposal may have implied that an applicant should take probability into account to determine whether the failure conditions would lead to fuel spillage. The FAA did not intend this. Probability should not be taken into account to determine whether the failure mode will lead to fuel spillage.

No other public comments were received on § 25.721. However, after further FAA review, we revised § 25.721(b) to clarify its intent. We removed the phrase ''as separate conditions,'' which was proposed in § 25.721(b)(1)(i) and (b)(2)(i), because we believe that phrase is confusing. In § 25.721(b)(1)(ii) and (b)(2)(ii), we also changed the proposed phrase ''any other combination of landing gear legs not extended'' to ''any one or more landing gear legs not extended'' which is the same phrase used in § 25.721(b) at Amendment 25–32. We made this change to ensure that applicants are required to address every possible combination of landing gear legs not extended, including single landing gear legs not extended. This is consistent with the way EASA has applied its rule.

Both §§ 25.721(b) and 25.994 final rules use the phrase ''wheels-up landing.'' This phrase has been used in § 25.994 since that rule was adopted at Amendment 25–23. A ''wheels-up landing'' includes every possible combination of landing gear legs not extended, including single landing gear legs not extended, and all gears fully retracted.

E. Section 25.787, Stowage Compartments

To date, § 25.787(a) has required that cargo compartments be designed to the emergency landing conditions of § 25.561(b), but excluded compartments located below or forward of all occupants in the airplane. The FAA now revises § 25.787(a) to include compartments located below or forward of all occupants in the airplane. This change would ensure that, in these compartments, inertia forces in the up and aft direction will not injure passengers, and inertia forces in any direction will not cause penetration of fuel tanks or lines, or cause other hazards.

A commenter recommended revising the text to clarify that only those specific emergency landing conditions that would result in one of the three listed effects need to be considered. The FAA agrees, and we have revised the text to clarify this intent.

The same commenter suggested that fires only need to be protected against if they can result in injury to occupants, and the rule text should be revised to clarify that intent. The FAA does not agree that fires only need to be protected against if they can result in injury to occupants. The FAA believes that the wording proposed in the NPRM is correct, and no change is necessary. The requirement intends protection against any fire or explosion on the airplane. Although the FAA agrees the objective of the rule is to prevent injuries to occupants, the FAA considers any fuel tank fire or explosion in an otherwise survivable landing as potentially injury-causing.

F. Section 25.963, Fuel Tanks: General

One commenter suggested that exactly the same wording be used in § 25.963(d) and CS 25.963(d). EASA CS 25.963(d) requires that no fuel be released in quantities ''sufficient to start a serious fire'' in otherwise survivable emergency landing conditions. Proposed § 25.963(d) would have required that no fuel be released in quantities ''that would constitute a fire hazard.'' The FAA stated in the NPRM that the two phrases have the same meaning, and that proposed § 25.963(d) was more consistent with the wording of the other related sections.

The FAA is adopting the wording proposed in the NPRM as more appropriate. As noted in the NPRM, the two phrases have the same meaning, and the latter phrase is consistent with the wording in CS 25.721/§ 25.721, CS 25.963(d)(4)/§ 25.963(d)(4), and CS 25.994/§ 25.994. In addition, EASA agrees with and supports the NPRM. In recent special conditions, the FAA has defined a hazardous fuel leak as ''a running leak, a dripping leak, or a leak that, 15 minutes after wiping dry, results in a wetted airplane surface exceeding 6 inches in length or diameter.'' We regard this as an appropriate definition of the amount of fuel that would ''constitute a fire hazard'' as specified in §§ 25.721, 25.963, and 25.994.

Another commenter suggested modifying § 25.963(d)(5) to reference landing gear before engine mounts in the rule text, since these are referred to respectively in § 25.721(a) and (c). The FAA agrees and the recommended change has been made.

EASA CS 25.963(e)(2) provides the fire protection criteria for fuel tank access covers. A commenter recommended that § 25.963(e)(2) be revised to match CS 25.963(e)(2), which the commenter believes is clearer. The FAA notes that this paragraph was not addressed in the NPRM and so will not be addressed in this final rule. The FAA might consider harmonizing this paragraph in the future.

No other public comments were received on § 25.963. However, after further FAA review, we determined that further explanation of the various requirements in § 25.963(d) would be beneficial. Section 25.963(d), as revised by Amendment 25-**, requires that ''Fuel tanks must, so far as it is practicable, be designed, located, and installed so that no fuel is released in or near the fuselage, or near the engines, in quantities that would constitute a fire hazard in otherwise survivable emergency landing conditions. . . .'' In addition to this primary requirement, § 25.963(d)(1) through (d)(5) provide minimum quantitative criteria. Survivable landing conditions may occur that exceed, or are not captured by, the conditions specified in § 25.963(d)(1) through (d)(5). Therefore, to meet the introductory requirement in § 25.963(d), every practicable consideration should be made to ensure protection of fuel tanks in more severe crash conditions, especially tanks located in the fuselage below the main cabin floor.

The fuel tank pressure loads specified in § 25.963(d) vary depending on whether the fuel tank is within or outside the pressure boundary. For certification of unpressurized airplanes, all fuel tanks should be considered to be ''within'' the fuselage pressure boundary, unless a fire resistant barrier exists between the fuel tank and the occupied compartments of the airplane.

Finally, the FAA notes that, for future rulemaking, we plan to consider specific crashworthiness requirements that would exceed the quantitative criteria specified in §§ 25.561, 25.721, and 25.963. Also, the FAA has recently applied special conditions on certain airplanes that require a crashworthiness evaluation at descent rates up to 30 feet per second.

G. Section 25.994, Fuel System Components

To date, § 25.994 has required that fuel system components in an engine nacelle or in the fuselage be protected from damage that could result in spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway. We proposed to revise § 25.994 to specify that the wheels-up landing conditions that must be considered are those prescribed in § 25.721(b).

A commenter proposed two changes to what the FAA proposed: (1) Add a reference to § 25.721(c), and (2) change the order in which the nacelles and the fuselage are referenced, based on the order the fuselage and nacelle are addressed in § 25.721. We do not agree with the proposed changes. Adding a reference to § 25.721(c) would not be correct because wheels-up landing conditions are only listed in § 25.721(b). Since § 25.721(c) is not referenced in § 25.994, and since § 25.721(b) does not refer to the fuselage or nacelles, there is no reason to change the order in which the fuselage and nacelles are specified in § 25.994.

H. Advisory Material

On March 13, 2013, the FAA published and solicited public comments on three proposed ACs that describe acceptable means for showing compliance with the proposed regulations in the NPRM. The comment period for the proposed ACs closed on June 14, 2013. Concurrently with this final rule, the FAA is issuing the following new ACs to provide guidance material for the regulations adopted by this amendment:

- AC 25–30, ''Fuel Tank Strength in Emergency Landing Conditions.'' (AC 25–30 would provide guidance for the fuel tank structural integrity requirements of §§ 25.561, 25.721, and 25.963.)
- AC 25.307–1, ''Proof of Structure.''
- AC 25.621–1, ''Casting Factors.''

IV. Regulatory Notices and Analyses

A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct 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 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this final rule.

Department of Transportation Order DOT 2100.5 prescribes policies and procedures for simplification, analysis, and review of regulations. If the expected cost impact is so minimal that a proposed or final rule does not warrant a full evaluation, this order permits that a statement to that effect and the basis for it be included in the preamble if a full regulatory evaluation of the cost and benefits is not prepared. Such a determination has been made for this final rule. The reasoning for this determination follows.

The FAA is amending certain airworthiness standards for transport category airplanes. Adopting this final rule would eliminate regulatory differences between the airworthiness standards of the FAA and the EASA. This final rule does not add new requirements as U.S. manufacturers currently meet EASA requirements. Meeting two sets of certification requirements imposes greater costs for developing new transport category airplanes with little to no increase in safety. In the interest of fostering international trade, lowering the cost of manufacturing new transport category airplanes, and making the certification process more efficient, the FAA, EASA, and several industry working groups came together to create, to the maximum extent possible, a single set of certification requirements that would be accepted in both the United States and Europe. Therefore, as a result of these harmonization efforts, the FAA is amending the airworthiness regulations described in section I of this final rule, ''Overview of the Final Rule.'' This action harmonizes part 25 requirements with the corresponding requirements in EASA CS–25 Book 1.

In order to sell their aircraft in Europe, all manufacturers of transport category airplanes, certificated under part 25 must be in compliance with the EASA certification requirements in CS–25 Book 1. Since future certificated transport airplanes are expected to meet CS–25 Book 1, and this rule simply adopts the same EASA requirements, manufacturers will incur minimal or no additional cost resulting from this final rule. Therefore, the FAA estimates that there are no additional costs associated with this final rule.

In fact, manufacturers could receive cost savings because they will not have to build and certificate transport category airplanes to two different authorities' certification specifications and rules. Further, harmonization of these airworthiness standards, specifically § 25.621 may benefit manufacturers by providing another option in developing aircraft structures. The final rule permits use of a lower casting factor for critical castings, provided that tight controls are established for the casting process, inspection, and testing, which lead to cost savings in terms of aircraft weight. These additional controls are expected to at least maintain an equivalent level of safety as provided by existing regulations for casting factors.

The FAA has not attempted to quantify the cost savings that may accrue from this final rule, beyond noting that, while they may be minimal, they contribute overall to a potential harmonization savings. The agency concludes that because the compliance cost for this final rule is minimal and there may be harmonization cost savings, further analysis is not required.

During the public comment period, the Agency received 16 comments from 5 commenters. There were no comments regarding costs to this final rule; however, one commenter raised concern for safety in § 25.621. Details of this comment and the FAA's response can be found in the ''General Overview of Comments'' section. These harmonization efforts ensure that the current level of safety in transport category airplanes is maintained while encouraging the use of modern casting process technology.

The agency concludes that the changes would eliminate regulatory differences between the airworthiness standards of the FAA and EASA resulting in potential cost savings and maintaining current levels of safety. The FAA has, therefore, determined that this final rule is not a ''significant regulatory action'' as defined in section 3(f) of Executive Order 12866, and is not ''significant'' as defined in DOT's Regulatory Policies and Procedures.

B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.'' The RFA 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 rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify, and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The FAA believes that this final rule does not have a significant economic impact on a substantial number of small entities for the following reasons. The net effect of this final rule is minimum regulatory cost relief, as the rule would adopt EASA requirements that the industry already meets. Further, all United States transport category aircraft manufacturers exceed the Small Business Administration small-entity criteria of 1,500 employees. The Agency received no comments regarding the Regulatory Flexibility Act during the public comment period.

If an agency determines that a rulemaking will not result in a significant economic impact on a substantial number of small entities, the head of the agency may so certify under section 605(b) of the RFA. Therefore, as provided in section 605(b), the head of the FAA certifies that this rulemaking will not result in a significant economic impact on a substantial number of small entities.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this final rule and determined that it is in accord with the Trade Agreements Act as the final rule uses European standards as the basis for United States regulation.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995 dollars) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a ''significant regulatory action.'' The FAA currently uses an inflation-adjusted value of $151 million in lieu of $100 million. This final rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. The FAA has determined that there would be no new requirement for information collection associated with this final rule.

F. International Compatibility and Cooperation

(1) In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these regulations.

(2) Executive Order (EO) 13609, Promoting International Regulatory Cooperation, (77 FR 26413, May 4, 2012) promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and reduce, eliminate, or prevent unnecessary differences in regulatory requirements. The FAA has analyzed this action under the policy and agency responsibilities of Executive Order 13609, Promoting International Regulatory Cooperation. The agency has determined that this action would eliminate differences between U.S. aviation standards and those of other civil aviation authorities by creating a single set of certification requirements for transport category airplanes that would be acceptable in both the United States and Europe.

G. Environmental Analysis

FAA Order 1050.1E identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 312f of Order 1050.1E and involves no extraordinary circumstances.

V. Executive Order Determinations

A. Executive Order 13132, Federalism

The FAA has analyzed this final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, does not have Federalism implications.

B. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it is not a ''significant energy action'' under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

VI. How To Obtain Additional Information

A. Rulemaking Documents

An electronic copy of a rulemaking document may be obtained by using the Internet—

1. Search the Federal eRulemaking Portal (*http://www.regulations.gov*),

2. Visit the FAA's Regulations and Policies Web page at *http://www.faa.gov/regulations_policies/,* or

3. Access the Government Printing Office's Web page at *http://www.gpo.gov/fdsys/.*

Copies may also be obtained by sending a request (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591; or by calling (202) 267–9680.

B. Comments Submitted to the Docket

Comments received may be viewed by going to *http://www.regulations.gov* and following the online instructions to search the docket number for this action. Anyone is able to search the electronic form of all comments received into any of the FAA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

C. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires the FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document, may contact its local FAA official, or the person listed under the **FOR FURTHER INFORMATION CONTACT** heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit *http://www.faa.gov/regulations_policies/rulemaking/sbre_act/.*

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends chapter I 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. Amend § 25.307 by revising paragraph (a) to read as follows:

§ 25.307 Proof of structure.

(a) Compliance with the strength and deformation requirements of this subpart must be shown for each critical loading condition. Structural analysis may be used only if the structure conforms to that for which experience has shown this method to be reliable. In other cases, substantiating tests must be made to load levels that are sufficient to verify structural behavior up to loads specified in § 25.305.

* * * * *

■ 3. Amend § 25.621 by revising paragraphs (a), (c), and (d) to read as follows:

§ 25.621 Casting factors.

(a) *General.* For castings used in structural applications, the factors, tests, and inspections specified in paragraphs (b) through (d) of this section must be applied in addition to those necessary to establish foundry quality control. The inspections must meet approved specifications. Paragraphs (c) and (d) of this section apply to any structural castings, except castings that are pressure tested as parts of hydraulic or other fluid systems and do not support structural loads.

* * * * *

(c) *Critical castings.* Each casting whose failure could preclude continued safe flight and landing of the airplane or could result in serious injury to occupants is a critical casting. Each critical casting must have a factor associated with it for showing compliance with strength and deformation requirements of § 25.305, and must comply with the following criteria associated with that factor:

(1) A casting factor of 1.0 or greater may be used, provided that—

(i) It is demonstrated, in the form of process qualification, proof of product, and process monitoring that, for each casting design and part number, the castings produced by each foundry and process combination have coefficients of variation of the material properties that are equivalent to those of wrought alloy products of similar composition. Process monitoring must include testing of coupons cut from the prolongations of each casting (or each set of castings, if produced from a single pour into a single mold in a runner system) and, on a sampling basis, coupons cut from critical areas of production castings. The acceptance criteria for the process monitoring inspections and tests must be established and included in the process specifications to ensure the properties of the production castings are controlled to within levels used in design.

(ii) Each casting receives:

(A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and

(B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods.

(iii) One casting undergoes a static test and is shown to meet the strength and deformation requirements of § 25.305(a) and (b).

(2) A casting factor of 1.25 or greater may be used, provided that—

(i) Each casting receives:

(A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and

(B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods.

(ii) Three castings undergo static tests and are shown to meet:

(A) The strength requirements of § 25.305(b) at an ultimate load corresponding to a casting factor of 1.25; and

(B) The deformation requirements of § 25.305(a) at a load of 1.15 times the limit load.

(3) A casting factor of 1.50 or greater may be used, provided that—

(i) Each casting receives:

(A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and

(B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods.

(ii) One casting undergoes a static test and is shown to meet:

(A) The strength requirements of § 25.305(b) at an ultimate load corresponding to a casting factor of 1.50; and

(B) The deformation requirements of § 25.305(a) at a load of 1.15 times the limit load.

(d) *Non-critical castings.* For each casting other than critical castings, as

specified in paragraph (c) of this section, the following apply:

(1) A casting factor of 1.0 or greater may be used, provided that the requirements of (c)(1) of this section are met, or all of the following conditions are met:

(i) Castings are manufactured to approved specifications that specify the minimum mechanical properties of the material in the casting and provides for demonstration of these properties by testing of coupons cut from the castings on a sampling basis.

(ii) Each casting receives:

(A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and

(B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods.

(iii) Three sample castings undergo static tests and are shown to meet the strength and deformation requirements of § 25.305(a) and (b).

(2) A casting factor of 1.25 or greater may be used, provided that each casting receives:

(i) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and

(ii) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods.

(3) A casting factor of 1.5 or greater may be used, provided that each casting receives inspection of 100 percent of its surface using visual inspection and liquid penetrant or equivalent inspection methods.

(4) A casting factor of 2.0 or greater may be used, provided that each casting receives inspection of 100 percent of its surface using visual inspection methods.

(5) The number of castings per production batch to be inspected by non-visual methods in accordance with paragraphs (d)(2) and (3) of this section may be reduced when an approved quality control procedure is established.

■ 4. Revise § 25.683 to read as follows:

§ 25.683 Operation tests.

(a) It must be shown by operation tests that when portions of the control system subject to pilot effort loads are loaded to 80 percent of the limit load specified for the system and the powered portions of the control system are loaded to the maximum load expected in normal operation, the system is free from—

(1) Jamming;

(2) Excessive friction; and

(3) Excessive deflection.

(b) It must be shown by analysis and, where necessary, by tests, that in the presence of deflections of the airplane structure due to the separate application of pitch, roll, and yaw limit maneuver loads, the control system, when loaded to obtain these limit loads and operated within its operational range of deflections, can be exercised about all control axes and remain free from—

(1) Jamming;

(2) Excessive friction;

(3) Disconnection; and

(4) Any form of permanent damage.

(c) It must be shown that under vibration loads in the normal flight and ground operating conditions, no hazard can result from interference or contact with adjacent elements.

■ 5. Revise § 25.721 to read as follows:

§ 25.721 General.

(a) The landing gear system must be designed so that when it fails due to overloads during takeoff and landing, the failure mode is not likely to cause spillage of enough fuel to constitute a fire hazard. The overloads must be assumed to act in the upward and aft directions in combination with side loads acting inboard and outboard. In the absence of a more rational analysis, the side loads must be assumed to be up to 20 percent of the vertical load or 20 percent of the drag load, whichever is greater.

(b) The airplane must be designed to avoid any rupture leading to the spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway, under the following minor crash landing conditions:

(1) Impact at 5 feet-per-second vertical velocity, with the airplane under control, at Maximum Design Landing Weight—

(i) With the landing gear fully retracted; and

(ii) With any one or more landing gear legs not extended.

(2) Sliding on the ground, with—

(i) The landing gear fully retracted and with up to a 20° yaw angle; and

(ii) Any one or more landing gear legs not extended and with 0° yaw angle.

(c) For configurations where the engine nacelle is likely to come into contact with the ground, the engine pylon or engine mounting must be designed so that when it fails due to overloads (assuming the overloads to act predominantly in the upward direction and separately, predominantly in the aft direction), the failure mode is not likely to cause the spillage of enough fuel to constitute a fire hazard.

■ 6. Amend § 25.787 by revising paragraph (a) to read as follows:

§ 25.787 Stowage compartments.

(a) Each compartment for the stowage of cargo, baggage, carry-on articles, and equipment (such as life rafts), and any other stowage compartment, must be designed for its placarded maximum weight of contents and for the critical load distribution at the appropriate maximum load factors corresponding to the specified flight and ground load conditions, and to those emergency landing conditions of § 25.561(b)(3) for which the breaking loose of the contents of such compartments in the specified direction could—

(1) Cause direct injury to occupants;

(2) Penetrate fuel tanks or lines or cause fire or explosion hazard by damage to adjacent systems; or

(3) Nullify any of the escape facilities provided for use after an emergency landing.

If the airplane has a passenger-seating configuration, excluding pilot seats, of 10 seats or more, each stowage compartment in the passenger cabin, except for under seat and overhead compartments for passenger convenience, must be completely enclosed.

* * * * *

■ 7. Amend § 25.963 by revising paragraph (d) to read as follows:

§ 25.963 Fuel tanks: general.

* * * * *

(d) Fuel tanks must, so far as it is practicable, be designed, located, and installed so that no fuel is released in or near the fuselage, or near the engines, in quantities that would constitute a fire hazard in otherwise survivable emergency landing conditions, and—

(1) Fuel tanks must be able to resist rupture and retain fuel under ultimate hydrostatic design conditions in which the pressure P within the tank varies in accordance with the formula:

$$P = K\rho gL$$

Where—

P = fuel pressure at each point within the tank

ρ = typical fuel density

g = acceleration due to gravity

L = a reference distance between the point of pressure and the tank farthest boundary in the direction of loading

K = 4.5 for the forward loading condition for those parts of fuel tanks outside the fuselage pressure boundary

K = 9 for the forward loading condition for those parts of fuel tanks within the fuselage pressure boundary, or that form part of the fuselage pressure boundary

K = 1.5 for the aft loading condition

K = 3.0 for the inboard and outboard loading conditions for those parts of fuel tanks

within the fuselage pressure boundary, or that form part of the fuselage pressure boundary

K = 1.5 for the inboard and outboard loading conditions for those parts of fuel tanks outside the fuselage pressure boundary

K = 6 for the downward loading condition

K = 3 for the upward loading condition

(2) For those parts of wing fuel tanks near the fuselage or near the engines, the greater of the fuel pressures resulting from paragraphs (d)(2)(i) or (d)(2)(ii) of this section must be used:

(i) The fuel pressures resulting from paragraph (d)(1) of this section, and

(ii) The lesser of the two following conditions:

(A) Fuel pressures resulting from the accelerations specified in § 25.561(b)(3) considering the fuel tank full of fuel at maximum fuel density. Fuel pressures based on the 9.0g forward acceleration may be calculated using the fuel static head equal to the streamwise local chord of the tank. For inboard and outboard conditions, an acceleration of 1.5g may be used in lieu of 3.0g as specified in § 25.561(b)(3).

(B) Fuel pressures resulting from the accelerations as specified in § 25.561(b)(3) considering a fuel volume beyond 85 percent of the maximum permissible volume in each tank using the static head associated with the 85 percent fuel level. A typical density of the appropriate fuel may be used. For inboard and outboard conditions, an acceleration of 1.5g may be used in lieu of 3.0g as specified in § 25.561(b)(3).

(3) Fuel tank internal barriers and baffles may be considered as solid boundaries if shown to be effective in limiting fuel flow.

(4) For each fuel tank and surrounding airframe structure, the effects of crushing and scraping actions with the ground must not cause the spillage of enough fuel, or generate temperatures that would constitute a fire hazard under the conditions specified in § 25.721(b).

(5) Fuel tank installations must be such that the tanks will not rupture as a result of the landing gear or an engine pylon or engine mount tearing away as specified in § 25.721(a) and (c).

* * * * *

■ 8. Revise § 25.994 to read as follows:

§ 25.994 Fuel system components.

Fuel system components in an engine nacelle or in the fuselage must be protected from damage that could result in spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway under each of the conditions prescribed in § 25.721(b).

Issued under authority provided by 49 U.S.C. 106(f), 44701(a), and 44703 in Washington, DC, on September 24, 2014.

Michael P. Huerta,

Administrator.

[FR Doc. 2014–23373 Filed 10–1–14; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA–2014–0366; Special Conditions No. 25–564–SC]

Special Conditions: Embraer S.A.; Model EMB–550 Airplane; Flight Envelope Protection: High Incidence Protection System

Correction

In rule document 2014–20893 appearing on pages 52165 through 52169 in the issue of Wednesday, September 3, 2014, make the following corrections:

1. On page 52169, in the first column, the 27th line from the bottom should read: ''In lieu of § 25.107(c) and (g) we propose the following requirements, with additional sections (c') and (g'):''

2. On page 52169, in the first column, the 11th line from the bottom should read: ''(c') In icing conditions with the ''takeoff ice'' accretion defined in part 25, appendix C, V2 may not be less than—''

3. On page 52169, in the second column, the eighth line from the top should read: ''(g') In icing conditions with the ''final takeoff ice'' accretion defined in part 25, appendix C, V_{FTO}, may not be less than—''

[FR Doc. C1–2014–20893 Filed 10–1–14; 8:45 am]

BILLING CODE 1505–01–P

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 117

[Docket No. USCG–2014–0848]

Drawbridge Operation Regulation; Sacramento River, Rio Vista, CA

AGENCY: Coast Guard, DHS.

ACTION: Notice of deviation from drawbridge regulation.

SUMMARY: The Coast Guard has issued a temporary deviation from the operating schedule that governs the Rio Vista Drawbridge across Sacramento River, mile 12.8, at Rio Vista, CA. The deviation is necessary to allow the bridge owner to make necessary bridge maintenance repairs. This deviation allows the bridge to open on four hours advance notice during the deviation period.

DATES: This deviation is effective without actual notice from October 2, 2014 through 6 a.m. on October 17, 2014. For the purposes of enforcement, actual notice will be used from 9 p.m. on September 22, 2014, until October 2, 2014.

ADDRESSES: The docket for this deviation, [USCG–2014–0848], is available at *http://www.regulations.gov.* Type the docket number in the ''SEARCH'' box and click ''SEARCH.'' Click on Open Docket Folder on the line associated with this deviation. You may also visit the Docket Management Facility in Room W12–140 on the ground floor of the Department of Transportation West Building, 1200 New Jersey Avenue SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: If you have questions on this temporary deviation, call or email David H. Sulouff, Chief, Bridge Section, Eleventh Coast Guard District; telephone 510–437–3516, email *David.H.Sulouff@uscg.mil.* If you have questions on viewing the docket, call Cheryl Collins, Program Manager, Docket Operations, telephone 202–366–9826.

SUPPLEMENTARY INFORMATION: The California Department of Transportation has requested a temporary change to the operation of the Rio Vista Drawbridge, mile 12.8, over Sacramento River, at Rio Vista, CA. The drawbridge navigation span provides 18 feet vertical clearance above Mean High Water in the closed-to-navigation position. In accordance with 33 CFR 117.5, the draw opens on signal. Navigation on the waterway is commercial, search and rescue, law enforcement, and recreational.

A four-hour advance notice for openings is required from 9 p.m. to 6 a.m. daily, from September 22, 2014 to October 17, 2014, to allow the bridge owner to repair the concrete vertical lift span deck. This temporary deviation has been coordinated with the waterway users. No objections to the temporary deviation were raised.

Vessels able to pass through the bridge in the closed position may do so at any time. The bridge will be able to open for emergencies with four hour advance notice. No alternative route is available for navigation. The Coast Guard will inform waterway users of