Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
General Structures Harmonization Working Group

Task 8 – Casting Factor

Task Assignment

[Federal Register: September 18, 1998 (Volume 63, Number 181)]
[Notices]
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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; Transport Airplane and Engine Issues, New Tasks

AGENCY: Federal Aviation Administration (**FAA**), DOT.

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

SUMMARY: Notice is given of new tasks assigned to and accepted by the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of ARAC.

FOR FURTHER INFORMATION CONTACT: Stewart R. Miller, Transport Standards Staff (ANM-110), Federal Aviation Administration, 1601 Lind Avenue, SW., Renton, WA 98055-4056; phone (425) 227-1255; fax (425) 227-1320.

SUPPLEMENTARY INFORMATION:

Background

The **FAA** has established an Aviation Rulemaking Advisory Committee to provide 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. This includes obtaining advice and recommendations on the **FAA**'s commitment to harmonize its Federal Aviation Regulations (FAR) and practices with its trading partners in Europe and Canada.

One area ARAC deals with is Transport Airplane and Engine Issues. These issues involve the airworthiness standards for transport category airplanes and engines in 14 CFR parts 25, 33, and 35 and parallel provisions in 14 CFR parts 121 and 135.

The Tasks

This notice is to inform the public that the **FAA** has asked ARAC to provide advice and recommendation on the following harmonization tasks.

Task 8: Casting Factors

Review the current standards of Sec. 25.621 and those proposed for the corresponding JAR 25.621 in NPA 25C-272 (circulated for public consultation by JAA on 16 November 1997) as they pertain to the

strength of structural castings. Review also any available **FAA** and JAA advisory material. In the light of this review, recommend changes to harmonize this section and the corresponding JAR paragraph, recommend new harmonized standards, and develop related advisory material as necessary.

The **FAA** expects ARAC to submit its recommendation(s) resulting from this task by July 31, 2001.

Task 9: Fuel Tank Access Doors

Review the current standards of FAR 25.963(e) and JAR 25.963(g) as they pertain to the requirements for fuel tank access doors impact and fire resistance. Review also the related **FAA** and JAA advisory material. In the light of this review, recommend changes to harmonize these sections and the corresponding JAR paragraphs, recommend new harmonized standards, and develop related advisory material as necessary.

The **FAA** expects ARAC to submit its recommendation(s) resulting from this task by July 31, 2001.

Task 10: Strength of Windshields and Windows

Review the current standards of Sec. 25.775 and those for corresponding JAR 25.775 as they pertain to the strength of windshields and windows. Review also any related **FAA** and JAA advisory material. In the light of this review, recommend changes to harmonize this section and the corresponding JAR paragraph, recommend new harmonized standards, and develop related advisory material as necessary.

The **FAA** expects ARAC to submit its recommendation(s) resulting from this task by March 31, 2001.

The **FAA** requests that ARAC draft appropriate regulatory documents with supporting economic and other required analyses, and any other related guidance material or collateral documents to support its recommendations. If the resulting recommendation(s) are one or more notices of proposed rulemaking (NPRM) published by the **FAA**, the **FAA** may ask ARAC to recommend disposition of any substantive comments the **FAA** receives.

Working Group Activity

The General Structures Harmonization Working Group is expected to comply with the procedures adopted by ARAC. As part of the procedures, the working group is expected to:

[[Page 49944]]

1. Recommend a work plan for completion of the tasks, including the rationale supporting such a plan, for consideration at the meeting of ARAC to consider transport airplane and engine issues held following publication of this notice.
2. Give a detailed conceptual presentation of the proposed recommendations, prior to proceeding with the work stated in item 3 below.
3. Draft appropriate regulatory documents 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. If the resulting recommendation is one or more notices of proposed rulemaking (NPRM) published by the **FAA**, the **FAA** may ask ARAC to recommend disposition of any substantive comments the **FAA** receives.

4. Provide a status report at each meeting of ARAC held to consider transport airplane and engine issues.

The Secretary of Transportation has determined that the formation and use of ARAC are necessary and in the public interest in connection with the performance of duties imposed on the **FAA** by law.

Meetings of ARAC will be open to the public. Meetings of the General Structures Harmonization 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 September 14, 1998.

Joseph A. Hawkins,

Executive Director, Aviation Rulemaking Advisory Committee.

[FR Doc. 98-25070 Filed 9-17-98; 8:45 am]

BILLING CODE 4910-13-M

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

800 Independence Ave., S.W.
Washington, D.C. 20591

DEC 16 1999

Mr. Craig Bolt
Assistant Chair, Advisory Committee on
Transport Airplane and Engine Issues
Pratt & Whitney
400 Main Street
East Hartford, CT 06106

Dear Mr. Bolt:

We recently received two letters transmitting documents from the General Structures Harmonization Working Group (HWG). The documents included:

1. Draft proposed rule and advisory circular for casting factors (letter dated July 27); and

2. Draft proposed rule and advisory circular for fuel tank access covers (letter dated July 28)

As discussed in recent Aviation Rulemaking Advisory Committee (ARAC) meetings on Transport Airplane and Engine Issues, the draft documents have not received preliminary reviews. The ARAC operating procedures call for technical writer/editor and attorney reviews before a document is submitted to ARAC for formal vote for submittal to the Federal Aviation Administration (FAA) for formal legal and economic reviews. Rather than return the documents for completion of these steps in the working group setting, the FAA will conduct preliminary reviews of the documents in hand, and–

1. If the revisions are minor, the FAA representative will notify the appropriate working group of the results of the preliminary review. The working group can review the documents and provide changes, if warranted, or alert the FAA to begin formal economic review.

2. If the revisions are substantial, the draft document will be returned to ARAC with a request that they be forwarded to the appropriate working group for consideration of the comments.

3. If only format and drafting requirements are needed, the economist and attorney will begin the formal reviews and ARAC will be notified when these steps are completed.

In the meantime, we suggest the working groups be instructed to review the draft documents to insure that the draft proposals address the questions contained in the Fast Tracked ARAC Working Group Report previously submitted to all working groups. The FAA intends to use the questions as a tool in conducting its preliminary reviews.

Sincerely,

Anthony F. Fazio
Executive Director, Aviation Rulemaking
Advisory Committee

Recommendation Letter

400 Main Street
East Hartford, Connecticut 06108

Pratt & Whitney
A United Technologies Company

July 27, 1999

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

Attn: Ms. Brenda Courtney, Acting Director – Office of Rulemaking

Dear Ms. Courtney:

The Transport Airplane and Engine Issues Group is pleased to provide the attached draft NPRM and AC for harmonization of FAR/JAR 25.621, Casting Factors to the FAA for formal legal and economic review. This draft NPRM and AC has been prepared by the General Structures Harmonization Working Group.

In summary, the rule change adds rule provisions allowing the use of a casting factor of 1.0 under certain conditions. The conditions are delineated in the rule and are further explained in the advisory material. The text of the rule has also been rearranged for clarification and ease of understanding. A new AC has been drafted, and it primarily addresses means of compliance for use of casting factor of 1.0, although some general rule advisory material is included.

The Structures Harmonization Working Group, with representatives from U.S., European and Canadian industry, the FAA, JAA and Transport Canada, examined the draft NPRM and draft AC for 25.621 to evaluate the cost impact for compliance relative to the existing regulatory material. The following is provided to assist the FAA economist in evaluation of this material.

1. Casting technology has made significant progress since the existing 25.621 rule was adopted. Today, much higher quality castings can be produced using improved foundry methods. For some time, the aircraft industry has needed a rule change to allow use of the technology to obtain lighter weight, lower cost parts. The new provision of the rule allowing use of a casting factor of 1.0 is not mandatory, but rather allows the applicant to select an alternative factor relative to applicable factors today. Therefore, the rule change is relieving and may in fact result in cost reductions.

2. The current JAR does not specify casting factors, but allows the use of the national rules of the JAA member countries. By adopting this harmonized material, the certification process and related costs will be improved for industry and authorities alike.

Craig R. Bolt

Craig R. Bolt
Assistant Chair, TAEIG
boltcr@pweh.com
(Ph: 860-565-9348/Fax: 860-557-2277)

CRB/amr

Attachment

cc: Dorenda Baker – FAA-ANM
Kristin Larson – FAA-ANM
Amos Hoggard - Boeing

Recommendation

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

Docket No. ; Notice No.]

RIN 2120–

[Title] Casting Factors

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to amend the casting factors requirements of §25.621 to permit the use of a casting factor of 1.0 for critical castings. For critical castings, the current regulation requires a minimum factor of 1.25, to be applied in addition to the factor required by §25.303. This proposal also would relieve manufacturers of the burden of dual certification by harmonizing the Federal Aviation Regulations (FAR) with the European Joint Aviation Requirements (JAR) and would eliminate differences in interpretation of rules by providing a companion advisory circular(AC).

DATES: Comments must be received on or before

ADDRESSES:
Comments on this document should be mailed or delivered, in duplicate, to: U.S. Department of Transportation Dockets, Docket No. [ ], 400 Seventh Street SW., Room Plaza 401, Washington, DC 20590. Comments also may be sent electronically to the following Internet address: 9-NPRM-CMTS@faa.gov. Comments may be filed and

examined in Room Plaza 401 between 10 a.m. and 5 p.m. weekdays, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: William M. Perrella, Federal Aviation Administration. 1605 Lind Ave SW, Renton, Washington, 98056; telephone 425 227-2116; facsimile 425-227-1100.

SUPPLEMENTARY INFORMATION:

Background: The current 14 CFR part 25 Airworthiness Standards of the Federal Aviation Regulations (FAR) requires classification of structural castings as either critical or non-critical, and depending on classification, specifies inspection requirements, test requirements, and special factors for ultimate strength and deformation.

The requirements specified in §25.621 have been in effect for many years, having been carried forward from CAR 4b.307. Prior to that, Civil Aeronautics Manual 04 required a minimum additional ultimate strength factor of 2.0 for castings used in primary structure. The Administrator had the authority to prevent the use of any casting which was not considered acceptable for a given application.

In recent years, casting technology has improved. The use of casting factors for critical applications often results in enough of a weight penalty that other, more expensive processes are necessary.

. The European Joint Aviation Requirements (JAR) accept the approved national standards of the participants as an alternative to FAR §25.621. The JAA also have a Notice of Proposed Amendment in process to add a new JAR 25.621, and to include provision for the use of a casting factor of 1.0. Because of the differences in the FAA and JAA requirements and the economic costs associated with those differences, the ARAC

General Structures Harmonization Working Group was tasked by the FAA to develop a common requirement. Part of the assigned task was to consider making provision in the rule to allow use of a casting factor of 1.0 for critical castings.

Discussion: Castings are subject to variability in mechanical properties due to the casting process, which can result in imperfections, such as voids, within the cast part. Using certain inspection techniques, for example X-ray, it is possible to detect such imperfections above a minimum detectable size which depends on the dimensions of the part, the inspection equipment used, and the skill of the inspector. Because of the uncertainties in both the casting process and the inspection process, a minimum casting factor of 1.25 is currently specified for critical castings. Associated with use of this casting factor are static tests and inspection requirements.

If tight controls are established on the casting process, it is possible to produce castings with variability of mechanical properties similar to those of wrought alloys. These castings, which are of high quality and reliability, are sometimes called "premium castings".

While the requirement for casting factors had long been in effect, in 1978 the fail-safe requirement of §25.571 was replaced by a damage tolerant requirement (amendment 25-45). Prior to amendment 25-45, the fail-safe features of the design were considered when deciding whether to classify a casting as critical or non-critical. For example, if two castings were used to perform a single function, and each had the ability to carry fail-safe loads, each casting could be considered non-critical. Under damage tolerance, multiple damage must be considered. A casting which is a PSE as defined in AC 25.571-1C or part of a PSE, the failure of which could preclude continued safe flight and landing,

must be classified as a critical casting. It is therefore proposed to revise the first sentence of section 25.621(c) by replacing the word "would" with the word "could".

During discussions by the working group, there was a question of whether a casting factor should be applied to residual strength loads, if such a factor were being applied to the ultimate load case for the undamaged part. The working group concluded that there was no justification or need to apply a factor to the residual strength loads of §25.571, since the factor was already being applied to the undamaged part, to account for uncertainties in material properties and inspection techniques. In fact, that is how the requirement has traditionally been interpreted and applied by FAA.

In addition, this proposal would permit the use of a casting factor of 1.0 for critical castings provided tight controls are established for the casting process, inspection, testing, and that material strength properties have no more variability than equivalent wrought alloys.

The working group concluded that each critical casting must receive visual and special nondestructive inspections, as required by the existing requirement, and any flaws smaller than detectable would not reduce the properties of the casting below that for which certification is shown. However, for large parts, not all areas of which may be sensitive to certain flaw types, the special nondestructive inspections could be limited to specified areas of the casting. This is provided that visual inspections would be capable of detecting the specified flaws for which certification is demonstrated. Static tests would still be required for a casting factor of 1.0; however, only one sample would be tested. This is because the material variability of such castings is similar to that of wrought alloys. The qualification program would have to ensure that the casting method

is able to produce a consistent product, with uniform properties throughout the casting. To help assure quality, test castings from several melts, using foundry production procedures, would be inspected, cut up and inspected, metallographically examined, and tested for mechanical properties. The companion advisory circular to this NPRM describes in detail a means for satisfying the requirements associated with the use of a casting factor of 1.0.

The use of a casting factor of 1.0 for critical castings would eliminate the weight penalty of the current requirement and enable less costly castings to be used in place of forgings, assembled structure, or machined parts.

Although the proposed rule covers a range of casting factors greater than one, it is anticipated that applicants will actually use the lower value of each band (1.0, 1.25, 1.50, 2.0).

The proposed 25.621(c) would require that for critical castings with a casting factor of greater than 1.5 one specimen needs to be statically tested. This is not required in the existing rule. The proposed requirement was added to assure the same confidence level in addressing material variability for critical castings for different possible casting factors.

Minor editorial changes were also made to paragraphs (a) and (d).

Comments Invited

Interested persons are invited to participate in the making of the proposed action by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, federalism, or economic impact that might result from adopting the proposals in this document also are invited. Substantive comments

should be accompanied by cost estimates. Comments must identify the regulatory docket or notice number and be submitted in duplicate to the DOT Rules Docket address specified above.

All comments received, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking, will be filed in the docket. The docket is available for public inspection before and after the comment closing date.

All comments received on or before the closing date will be considered by the Administrator before taking action on this proposed rulemaking. Comments filed late will be considered as far as possible without incurring expense or delay. The proposals in this document may be changed in light of the comments received.

Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this document must include a pre-addressed, stamped postcard with those comments on which the following statement is made: "Comments to Docket No. ." The postcard will be date stamped and mailed to the commenter.

Availability of NPRMs

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

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

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

Persons interested in being placed on the mailing list for future rulemaking documents should request from the above office a copy of Advisory Circular No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure

Paperwork Reduction Act

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

Compatibility With ICAO Standards

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with 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 proposed regulations.

Regulatory Evaluation Summary

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, OMB directs agencies to assess the effect of regulatory changes on international trade. In conducting these analyses, the FAA has determined this proposed rule is not "a significant regulatory action" under section 3(f) of Executive Order 12866 and, therefore, is not subject to review by the Office of Management and Budget. This proposed rule is not considered significant under the regulatory policies and procedures of the Department of Transportation (44 FR 11034, February 26, 1979). This proposed rule would not have a significant impact on a substantial number of small entities and would not constitute a barrier to international trade. The FAA invites the public to provide comments and supporting data on the assumptions made in this evaluation. All comments received will be considered in the final regulatory evaluation.

[*Insert summary of the economic evaluation prepared by APO.*]

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act (RFA) of 1980, 5 U.S.C. 601–612, was enacted by U.S. Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a regulatory flexibility analysis if a proposed rule has a significant economic impact on a substantial number of small business entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold costs and small entity size standards for complying with RFA requirements.

[*Insert summary of the regulatory flexibility finding prepared by APO.*]

International Trade Impact Statement

The provisions of this proposed rule would have little or no impact on trade for U.S. firms doing business in foreign countries and foreign firms doing business in the United States.

Federalism Implications

The regulations proposed herein would not have a substantial direct effect 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.

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), codified in 2 U.S.C. 1501—1571, requires each Federal agency, to the extent permitted by law, to

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

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

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment or environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), regulations, standards, and exemptions (excluding those, which if implemented may cause a significant impact on the human environment) qualify for a categorical exclusion. The FAA proposes that this rule qualifies for a categorical exclusion because no significant impacts to the environment are expected to result from its finalization or implementation.

Energy Impact *The OPI is responsible for assessing the energy impact of a proposed rule. State whether the energy impact of the proposed rule has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) and Public Law 94–163, as amended (42 U.S.C. 6362). Also state whether it has been determined that it is not a major regulatory action under the provisions of the EPCA. AEE currently is drafting standard language for this statement.*

List of Subjects in 14 CFR Part 25

List of Subjects *List the parts in numerical order.*

14 CFR Part 25

Insert appropriate index terms.

14 CFR Part 25

Insert appropriate index terms.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend part 25 of Title 14, Code of Federal Regulations as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

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

Authority: 49 U.S.C.[]

Amend §25.621 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.

(b) * * * *

(c) *Critical castings.* Each casting whose failure could preclude continued safe flight and landing of the airplane or result in serious injury to occupants is considered to be a critical casting. Examples of castings which may be critical are structural attachment fittings, parts of flight control systems, control surface hinges and balance weight attachments, seat, berth, safety belt, fuel and oil tank supports and attachments, pressurized doors, and cabin pressure valves. Each critical casting must have a factor associated with it for showing compliance with strength and deformation requirements and comply with the following criteria associated with that factor:

1) A Casting Factor of greater than or equal to 1.0 and less than 1.25 may be used provided that:

   i. Castings are procured and manufactured to specifications that guarantee the mechanical properties of the material in the casting considering environmental

effects, variability and also provides for demonstration of these properties by testing of coupons cut from the castings on a routine basis. There must be demonstration in the form of process qualification, proof of product, and process monitoring that for each casting design the castings produced by each foundry, and process combination consistently meet the required specifications. The coefficients of variation of the casting material properties must be equivalent to those of wrought products of similar composition.

ii. Each casting must receive 100 percent inspection by visual, radiographic, and liquid penetrant methods or approved equivalent nondestructive inspection methods.

iii. One casting must be statically tested and shown to meet the strength and deformation requirements of § 25.305.

2) Casting Factors of greater than or equal to 1.25 and less than 1.50 may be used provided that:

i. Each casting must receive 100 percent inspection by visual, radiographic, and liquid penetrant methods or approved equivalent nondestructive inspection methods.

ii. Three castings must be statically tested and shown to meet:

- The strength requirements of § 25.305 at an ultimate load corresponding to a casting factor of 1.25;

- The deformation requirements of § 25.305 at a load of 1.15 times the limit load.

3) Casting Factor of 1.50 or greater may be used provided that:

i. Each casting must receive 100 percent inspection by visual, radiographic, and liquid penetrant methods or approved equivalent nondestructive inspection methods.

ii. One casting must be statically tested and shown to meet:

- The strength requirements of § 25.305 at an ultimate load corresponding to a casting factor of 1.50;

- The deformation requirements of § 25.305 at a load of 1.15 times the limit load.

(d) Noncritical castings. For each casting other than critical castings as specified in paragraph (c) of this section, the following apply:

1) A Casting Factor of greater than or equal to 1.0 and less than 1.25 may be used provided that the requirements of (c)(1) are met or:

i. Castings are procured and manufactured to a specification that guarantees the 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 must receive 100 percent inspection by visual, radiographic, and liquid penetrant methods or approved equivalent nondestructive inspection methods.

iii. Three sample castings must be statically tested and shown to meet the strength and deformation requirements of § 25.305.

2) A Casting Factor of greater than or equal to 1.25 and less than 1.50 may be used provided that

Each casting must receive 100 percent inspection by visual, radiographic, and liquid penetrant methods or approved equivalent nondestructive inspection methods.

3) A Casting Factor of greater than or equal to 1.5 and less than 2.0 may be used provided that each casting must receive 100 percent inspection by visual and liquid penetrant methods or approved equivalent nondestructive inspection methods.

4) A Casting Factor of 2.0 or greater may be used provided that

Each casting must receive 100 percent visual inspection.

5) The percentage of castings inspected by non-visual methods per (d)(2) and (d)(3) may be reduced when an approved quality control procedure is established.

Issued in Washington, DC, on .

ARAC General Structures Harmonisation Working Group

Draft AC 25.621

18 May 1999

1. **Purpose:** This advisory circular (AC) sets forth acceptable means of compliance with the provisions of part 25 of the Federal Aviation Regulations (FAR) pertaining to the certification requirements for castings used for structural applications. Guidance information is provided for showing compliance with section 25.621. Other methods of compliance may be acceptable.

2. **Related FAR sections:** 25.619, 25.613, 25.307

3. **Background:** The current 14 CFR part 25 Airworthiness Standards of the Federal Aviation Regulations (FAR) requires classification of structural castings as either critical or non-critical, and depending on classification, specifies inspection requirements, test requirements, and special factors for ultimate strength and deformation

The requirements specified in §25.621 have been in effect for many years, having been carried forward from CAR 4b.307. Prior to that, Civil Aeronautics Manual 04 required a minimum additional ultimate strength factor of 2.0 for castings used in primary structure. The Administrator had the authority to prevent the use of any casting which was not considered acceptable for a given application.

In recent years, casting technology has improved. The use of casting factors for critical applications often results in enough of a weight penalty that other, more expensive processes are necessary.

The European Joint Aviation Requirements (JAR) accept the approved national standards of the participants as an alternative to FAR §25.621. The JAA also have a Notice of Proposed Amendment in process to add a new JAR 25.621, and to include provision for the use of a casting factor of 1.0. Because of the differences in the FAA and JAA requirements and the economic costs associated with those differences, the ARAC General Structures Harmonization Working Group was tasked by the FAA to develop a common requirement. Part of the assigned task was to consider making provision in the rule to allow use of a casting factor of 1.0 for critical castings. The requirement was revised accordingly.

4. **Introduction:** §25.619 includes the requirement to apply a special factor to the factor of safety prescribed in §25.303 for each part of the structure whose strength is subject to appreciable variability because of uncertainties in the manufacturing processes or inspection methods. Since the mechanical properties of a casting depend on the casting design, design values established under §25.613 for one casting may not be applicable to another casting made to the same specification. Thus casting factors are necessary for castings produced by normal techniques and methodologies to ensure the structural integrity of castings in-spite of these uncertainties. Another approach is to reduce the uncertainties in the manufacturing process by use of a premium casting process (Reference paragraph 5), which provides a means of using a casting factor of 1.0.

5.0 Premium Castings: This section provides guidance for compliance with 25.621 for using a casting factor greater than or equal to 1.0 and less than 1.25 for critical castings. A premium casting process **is** capable of producing castings with predictable properties, thus allowing a casting factor of 1.00 to be used for these components. Three major steps: qualification of the process; proof of the product, and monitoring the process are essential in characterizing the premium casting process.

5.1 *Definitions*

5.1.1 *Premium Casting Process*: a casting process that produces castings characterised by a high quality and reliability.

5.1.2 *Prolongation*: an integrally cast test bar or test coupon.

5.1.3 *Standard Test Casting*: a casting produced specifically for the purpose of qualifying the casting process.

5.2. *General.* The objective of a Premium Casting Process is to consistently produce castings with high quality and reliability. To this end the casting process must be capable of consistently producing castings which have the following list of characteristics:-

Good dimensional tolerance
Minimal distortion
Good surface finish
No cracks
No cold shuts
No laps
Minimal shrinkage cavities
No harmful entrapped oxide films
Minimal porosity
A high level of metallurgical cleanness
Good microstructural characteristics
Minimal residual internal stress
Consistent mechanical properties

Although the majority of the above can be detected, evaluated and quantified by standard non destructive testing methods or from destructive methods on prolongation or casting cut up tests, a number can not. Thus to ensure an acceptable quality of product the significant and critical process variables must be identified and adequately controlled.

5.3. *Qualification of Casting Process.* To prove a premium casting process, it should be submitted to a qualification programme which is specific to a foundry/material combination.

The qualification programme should establish the following;

1) The casting process is capable of producing a consistent quality of product for the specific material specification selected for the intended production component.

2) The mechanical properties for the material produced by the process have population coefficients of variation equivalent to that of wrought products of similar composition (i.e. plate, extrusions, bar, and billet). Usage of the population coefficient of variation from forged products is not acceptable.

3) The casting process is capable of producing a casting with uniform properties throughout the casting, or if not uniform the variability can be predicted to an acceptable level of accuracy.
4) The (initial) material design data for the specified material.
5) Clearly defined material and process specifications.

For each material specification, there should be manufactured a series of standard test castings from a number of melts, using the appropriate production procedures of the foundry. The standard test casting produced should undergo a standardised inspection/investigation of nondestructive inspection and cut up testing, to determine the consistency of the casting process.

The standard test casting should be representative of the intended cast product/s, and should expose any limitations of the casting process. In addition, the standard test casting should be large enough to provide mechanical test specimens from various areas, for tensile, and possibly compression, shear, bearing, fatigue, fracture toughness and crack propagation tests. If the production component complies with these requirements it may be used to qualify the process. At least 10 melts should be sampled, with no more than 10 castings produced from each melt. If the material specification requires the components to be heat treated this should be done in no fewer than 10 heat treatment batches consisting of castings from more than one melt. Reduction of qualification tests may be considered if the casting process and/or the casting alloy is already well known for aerospace applications and the relevant data is available.

All standard test castings should be nondestructively inspected 100%, by liquid penetrant and X-ray methods. The specific X-ray standard to be employed is to be determined and the margin by which the standard test castings exceed the minimum required standard recorded. The programme of inspection is to confirm the consistency of the casting process as well as ensuring the stated objectives on surface finish, cracks, cold shuts, laps, shrinkage cavities, and porosity. In addition it is to ensure that the areas from which the mechanical property samples were taken were typical of the casting as a whole with respect to porosity and cleanness.

All standard test castings should be cut up to a standardised methodology to produce the mechanical test specimens detailed above. Principally the tests are to establish the variability within the cast component as well as determining the variability between components from the same melt, and from melt to melt. The data gathered will also be used during latter phases to identify deviations from the limits established in the process qualification and product proving programmes.

All the fracture surfaces generated during the qualification programme must be inspected at least visually for detrimental defects.

As part of the cut up investigation it is usually necessary to take metallographic samples for cleanness determination and microstructural characterisation.

When the process has been qualified, it should not be altered without completing comparability studies and necessary testing of differences (See paragraph 7).

5.4 *Proof of Product.* Subsequent to the qualification of the process, the production castings should be subjected to a production proving programme. Such castings should have at least one prolongation, however large and/or complex castings may require more than one. If a number of castings are produced from a single mould with a single runner system, they may be treated as one single casting.

The production proving programme should establish;

1) That the design allowables developed during the process qualification programme are valid for the production casting.
2) That the production castings have the same or less than the level of internal defects as the standard test castings produced during qualification.
3) That the cast components have a predictable distribution of tensile properties.
4) That the prolongation/s is/are representative of the critical area/s of the casting.
5) That the prolongation/s consistently reflect quality process, and material properties of the casting.

A number of, at least two, preproduction castings of each part number to be produced should be selected for testing and inspection. All the selected castings should be non destructively inspected as per the qualification programme. One of these castings should be used as a dimensional tolerance test article. The other selected casting/s should be cut up for mechanical property testing and metallographic inspection. The casting/s should be cut up to a standardised programme to yield a number of tensile test specimens and if required, metallograghic samples. There should be sufficient cut up tensile specimens to cover all critical (critical with respect to both the casting process and service loading) areas of the casting. All prolongations should be machined to give tensile specimens and subsequently tested. The production castings should be produced to production procedures identical to those used for these preproduction castings.

On initial production a number of castings should undergo a cut up for mechanical property testing and metallographic inspection, similar to that performed for the preproduction casting/s. The cut up procedure used should be standardised, although it may differ from that used for the preproduction casting/s, but as a minimum tensile specimens should be obtained from the most critical areas. For the first 30 castings produced at least 1 casting in 10 should undergo this testing programme. The results from the mechanical property tests should be compared with the results obtained from the prolongations to further substantiate the correlation's between prolongation/s and the critical area/s of the casting. In addition, if the mechanical properties derived from these tests are acceptable, when compared to the property values determined in the qualification programme, the frequency of testing may be reduced. However, if the comparison is found not to be acceptable, the test programme may require extension.

At no point in the production should the castings contain shrinkage cavities, cracks, cold shuts, laps, porosity, entrapped oxide film, or have a poor surface finish, exceeding the acceptance level defined in the technical specifications.

5.5. *Monitoring the Process.* The applicant should employ quality techniques to establish the significant/critical foundry process variables which impact on the quality of the product. The applicant should show that these variables are controlled with positive corrective action throughout production.

During production every casting should be non destructively inspected using the techniques and the acceptance standards employed during the qualification programme. Rejections should be investigated and process corrections made as necessary. Alternative techniques may be employed if the equivalence in the acceptance levels can be demonstrated. In addition tensile tests should be taken from the prolongations on every component produced and the results should comply with limits developed in the process qualification and product proving programme. Also, as previously mentioned, a periodic casting cut up inspection should be undertaken, with the periodicity as agreed during the proof of product programme. Deviations from the limits established in the process qualification and product proving programmes should be investigated and corrective action taken.

5.6 *Modifications to the Casting Design, Material, and Process.* Additional testing may be required when alterations are made to the casting geometry, material, significant/critical process variables, process, or production foundry to verify that the alterations have not significantly changed the castings properties. The verification testing recommended is detailed in the table below.

Modifications					Verification testing		
Case	Geometry	Material	Process	Foundry	Qualification of Process	Proof of Product	Tests per FAR 25.621 (c)(1)
1	?slight [similarity]	none	none	none	not necessary	yes	yes b)
2	slight [similarity]	?yes	none	none	yes a)	yes	yes a) & b)
3	?yes	yes	none	none	yes	yes	yes
4	none	none	none	none	not necessary	yes	yes a)
5	none	none	?yes	none	yes a)	yes	yes a) & b)
6	none	none	none	?yes [second-source]	yes a)	yes	yes a) & b)

a) A programme as per paragraph 4 to qualify a new material, process, foundry combination, as well as static tests as per FAR 25.621(c)(1), may not be necessary if the following exist for the new combination.

1) Sufficient data from relevant castings to show that the process is capable of producing a consistent quality of product, and that the quality is comparable or better than the old combination.
2) Sufficient data from relevant castings to establish that the mechanical properties of the castings produced from the new combination have a similar or better statistical distribution than the old combination.
3) Clearly defined material and process specifications.

b) The casting may be re-qualified by testing partial static test samples (with larger castings re-qualification could be undertaken by static test of the casting's critical region only), this should be approved.

6.0 General guidance for use of casting factors

6.1 For the analysis or testing required by 25.307, the ultimate load level must include limit load times the required factor of safety and the casting factor of 25.621. The testing required under 25.621 may be used in showing compliance with 25.305 and 25.307.

6.2 The inspection methods prescribed by 25.621(c) and (d) for all production castings must be such that 100% of the castings are inspected by visual and liquid penetrant techniques with total coverage of the casting. With regard to the required radiographic inspection each production casting must be inspected by this technique, however due to the practicalities of this technique the inspection may be limited to the structurally significant areas of the castings, when approved by the Administrator.

6.3 With the establishment of consistent production, it is possible to reduce the inspection frequency of the non-visual inspections required by the rule for non-critical castings with the approval of the administrator. This is usually accomplished by an approved quality control procedure incorporating a sampling plan.

6.4 The static test specimen(s) should be selected on the basis of the foundry quality control inspections in conjunction with those prescribed in §25.621(c) and (d). An attempt should be made to select the worst casting(s) from the first batch produced to the production standard.

{AE1}

Mr. Ron Priddy
President, Operations
National Air Carrier Association
1100 Wilson Blvd., Suite 1700
Arlington, VA 22209

Dear Mr. Priddy:

The Federal Aviation Administration (FAA) recently completed a regulatory program review. That review focused on prioritizing rulemaking initiatives to more efficiently and effectively use limited industry and regulatory rulemaking resources. The review resulted in an internal Regulation and Certification Rulemaking Priority List that will guide our rulemaking activities, including the tasking of initiatives to the Aviation Rulemaking Advisory Committee (ARAC). Part of the review determined if some rulemaking initiatives could be addressed by other than regulatory means, and considered products of ARAC that have been or are about to be forwarded to us as recommendations.

The Regulatory Agenda will continue to be the vehicle the FAA uses to communicate its rulemaking program to the public and the U.S. government. However, the FAA also wanted to identify for ARAC those ARAC rulemaking initiatives it is considering to handle by alternative actions (see the attached list). At this time, we have not yet determined what those alternative actions may be. We also have not eliminated the possibility that some of these actions in the future could be addressed through rulemaking when resources are available.

If you have any questions, please feel free to contact Gerri Robinson at (202) 267-9678 or gerri.robinson@faa.gov.

Sincerely,

Anthony F. Fazio
Executive Director, Aviation Rulemaking Advisory Committee

Enclosure

cc:
William W. Edmunds, Air Carrier Operation Issues
Sarah MacLeod, Air Carrier/General Aviation Maintenance Issues
James L. Crook, Air Traffic Issues
William H. Schultz, Aircraft Certification Procedures Issues
Ian Redhead, Airport Certification Issues

Billy Glover, Occupant Safety Issues
John Tigue, General Aviation Certification and Operations Issues
David Hilton, Noise Certification Issues
John Swihart, Rotorcraft Issues
Roland B. Liddell, Training and Qualification Issues
Craig Bolt, Transport Airplane and Engine Issues

ARAC Projects that will be handled by Alternative Actions rather than Rulemaking

(Beta) Reverse Thrust and propeller Pitch Setting below the Flight Regime (25.1155)
Fire Protection (33.17)
Rotor Integrity--Overspeed (33.27)
Safety Analysis (33.75)
Rotor Integrity – Over-torque (33.84)
2 Minute/30 Second One Engine Inoperative (OEI) (33.XX)
Bird Strike (25.775, 25.571, 25.631)
Casting Factors (25.621)
Certification of New Propulsion Technologies on Part 23 Airplanes
Electrical and Electronic Engine Control Systems (33.28)
Fast Track Harmonization Project: Engine and APU Loads Conditions (25.361, 25.362)
Fire Protection of Engine Cowling (25.1193(e)(3))
Flight Loads Validation (25.301)
Fuel Vent System Fire Protection (Part 25 and Retrofit Rule for Part 121, 125, and 135)
Ground Gust Conditions (25.415)
Harmonization of Airworthiness Standards Flight Rules, Static Lateral-Directional Stability, and Speed Increase and Recovery Characteristics (25.107(e)(1)(iv), 25.177©, 25.253(a)(3)(4)(50)). Note: 25.107(a)(b)(d) were enveloping tasks also included in this project—They will be included in the enveloping NPRM)
Harmonization of Part 1 Definitions Fireproof and Fire Resistant (25.1)
Jet and High Performance Part 23 Airplanes
Load and Dynamics (Continuous Turbulence Loads) (25.302, 25.305, 25.341 (b), etc.)
Restart Capability (25.903(e))

Standardization of Improved Small Airplane Normal Category Stall Characteristics Requirements (23.777, 23.781, 23.1141, 23.1309, 23.1337, 25.1305)

ATTC (25.904/App I)
Cargo Compartment Fire Extinguishing or Suppression Systems (25.851(b), 25.855, 25.857)
Proof of Structure (25.307)
High Altitude Flight (25.365(d))
Fatigue and Damage Tolerance (25.571)
Material Prosperities (25.604)

Rules and Regulations

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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]

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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]

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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