Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
General Structures Harmonization Working Group

Task 9 – Fuel Tank Access Doors

Task Assignment

[Federal Register: September 18, 1998 (Volume 63, Number 181)]
[Notices]
[Page **49943**-49944]
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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

Recommendation Letter

400 Main Street
East Hartford, Connecticut 06108

Pratt & Whitney
A United Technologies Company

July 28, 1999

9

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 25.963, Fuel Tank Access Covers, to the FAA for formal legal and economic review. This draft NPRM and AC has been prepared by the General Structures Harmonization Working Group.

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
Marc Bouthillier – FAA-NER
Amos Hoggard - Boeing
Kristin Larson – FAA-ANM
Judith Watson – FAA-NER

Acknowledgement Letter

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

PROPOSAL 2 NPRM

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

Docket No. ; Notice No.]

RIN 2120–

[Title] Fuel Tank Access Covers

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to amend the fire resistance requirements of §25.963(e)(2) to provide an equal level of safety for the fuel tank structure and the fuel tank access covers. The current requirement specifies that fuel tank access covers must be fire resistant as defined in part 1. The amendment would include an option permitting fuel tank access covers to have a level of fire resistance equivalent to the surrounding tank structure.

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 that fuel tank access covers must be fire resistant as defined in part 1. That requirement was adopted by amendment 25-69 after an FAA review of adverse service experience prompted by an accident in Manchester, England.

Discussion: Section 25.963(e)(2) states that fuel tank access covers must be fire resistant as defined in part 1. The equivalent JAA requirement does not have any standard for fire resistance. In the interest of harmonization, the GSHWG has recommended that JAR 25 should be revised to include a requirement for fire resistant fuel tank access covers. The definition of the term 'fire resistant' differs between the FAR and JAR. The JAA recently revised the definition in JAR 1 to indicate that fire resistant materials are those which can withstand the ISO.....flame applied for 5 minutes. The FAA definition in part 1, which has been in existence for many years, refers to equivalency to aluminum in the dimensions appropriate for the application. The FAA has no intention to make the existing FAA requirement more stringent, however, the different definitions between JAA and FAA would result in different compliance standards. The working group therefore established new criteria which would provide an acceptable level of safety. Section 25.963(e)(2) would be revised to eliminate the term 'fire resistant as defined in part 1', and to provide several options for showing a minimum level for resistance to fire. Compliance could be shown if one of the following options

could be met: (a) The tank access covers are made of aluminum, titanium, or steel, or (b) the tank covers can withstand the test of AC 20-135, or ISO 2685-1992(E) for a period of 5 minutes without failure, or (c) the tank covers can withstand the test of AC 20-135, or ISO 2685-1992(E) for a period of time at least as great as that of the immediately surrounding structure (such as the wing skins for wing fuel tanks).

This revision would permit fuel tank access covers to have the same level of fire resistance as the surrounding tank structure, thereby providing an equal level of safety for the entire fuel tank relative to fire resistance.

After the working group reached agreement on the above criteria, they coordinated with the JAA PPSG. The PPSG could not accept adding the proposed requirement to the JAA rule, since they believe there is no fire resistance requirement for the basic fuel tank structure. Therefore JAA never reached final technical agreement on this proposal. FAA is taking this action unilaterally, without concurrence by the JAA.

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 §25.963(e)(2) to read as follows:

"(2) All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminum alloy in dimensions appropriate for the purpose for which they are to be used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material."

Issued in Washington, DC, on .

PROPOSAL 2 AC

Draft
Fuel Tank Access Doors
AC 25.963-1
May 19, 1999

1. PURPOSE. This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of 25.963(e).

2. RELATED FAR SECTIONS. The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with 25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of 25.963(e).

3. BACKGROUND. Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a fuel tank may result in loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE.

a) All fuel tanks access covers must be designed to minimise penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimise penetration and deformation" by analysis or test of covers using debris of a type, size, trajectory and velocity that represents conditions anticipated in actual service for airplane model involved. There should be no hazardous quantity of fuel leakage after impact. It may not be practical or even necessary to provide access covers with properties which are identical to those of the adjacent skin panels since the panels usually vary in thickness from station to station and may, at certain stations, have impact resistance in excess of that needed for any likely impact. The access covers, however, need not be more impact resistant than the average thickness of the adjacent tank structure at the same location, had it been designed without access covers. In the case of resistance to tire debris, this comparison should be shown by tests or analysis supported by test.

b) In the absence of a more rational method, the following may be used for evaluating access covers for impact resistance to tire and engine debris.

i) Tire Debris - Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with the gear in the down and locked position and the oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass distributed over an impact area equal to 1½ percent of the total tread area. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground under normal operation.

i) Engine Debris - Covers located within 15 degrees forward of the front engine compressor or fan plane measured from the center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from the center of rotation, should be evaluated for impact from small fragments. The evaluation should be made with energies referred to in AC 20-128A, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure. The covers need not be designed to withstand impact from high energy engine fragments such as engine rotor segments or propeller fragments. In the absence of relevant data, an energy level corresponding to the impact of a 3/8 inch cube steel debris at 700fps, 90 degrees to the impacted surface or area should be used.
(For clarification, engines as used in this advisory material is intended to include engines used for thrust and engines used for auxiliary power, APU.)

ii)

5. RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of 25.963(e)(2) if they are fabricated from solid aluminium or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminium alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or-ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5 minutes. The test cover should be installed in a test fixture representative of actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be

accounted for during the burn test. There should be no burn-through or *distortion that would lead to* fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

Recommendation Letter

400 Main Street
East Hartford, Connecticut 06108

Pratt & Whitney
A United Technologies Company

April 4, 2000

Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

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

Subject: ARAC Recommendation

Reference: ARAC Tasking, Federal Register, November 19, 1999

Dear Tom,

The Transport Airplane and Engine Issues Group is pleased to submit the following "Fast Track" reports as recommendations to the FAA in accordance with the reference tasking. These reports have been prepared by the General Structures Harmonization Working Group.

- 25.783 Doors (Note that the report addresses safety issues raised by the NTSB but the proposal is considered non controversial and appropriate for the Fast Track process.)
- 25.683 Operational Tests
- 25.963 Fuel Tank Access Cover ANM-98-466-A

Sincerely yours,

Craig R. Bolt

Craig R. Bolt
Assistant Chair, TAEIG

Attachments

Copy: Kris Carpenter - FAA-NWR
*Amos Hoggard - Boeing
*Effie Upshaw - FAA Washington, DC

*letter only

CRB07_040400

Recommendation

Attachment A

Supplemental Data – Fuel Tank Access Cover Fire Resistance

FAA Background Data

Excerpts from
FAA Comments to JAA NPA 25E-304
Fuel Tank Structural Integrity / Fuel Tank Access Covers

Fuel Tank Access Covers

The ARAC recommendation is to incorporate wording directly into the rule (FAR/JAR 25.963(d)) that would allow the fuel tank access panels to be "equivalent to the adjacent / surrounding skin," rather than meet the fire resistant standard stated in the current FAR. This proposal is a step backward in fuel tank safety, particularly in the post crash fire environment.

The current transport fleet post crash safety record is based upon use of aluminum structures. These structures conduct heat well and are "fire resistant" as defined in FAR 1.1. The fire resistance requirement in FAR 25.963 was introduced because of the use of nylon fuel tank access panels by one manufacturer. These panels suffered severe damage when exposed to underwing fires. The doors were replaced with cast aluminum doors to provide appropriate fire resistance. The impact resistance of fuel tank panels made of cast aluminum, however, was found to cause a safety concern. Therefore, the cast aluminum doors were replaced by doors with improved impact resistance in areas of the wing exposed to tire and uncontained engine debris. FAR 25.963 was amended to require both fire resistance and impact resistance for fuel tank access panels. While this rulemaking addressed the adverse service experience of conventional transport airplanes with fuel tank structures that were made of impact and fire resistant aluminum, the FAA did not foresee the future use of composite structures nor possible development of non-conventional delta wing designs that may significantly reduce the inherent safety of conventional fuel tank designs. Looking back, FAR 25.963 should have established an objective standard for fuel tanks integrity for impact and fire resistance.

The Concorde and other accidents have highlighted the safety implications of damage to fuel tanks from debris or fire. The delta wing design of the Concorde allows the use of lower wing skins made of 1.2 mm titanium. While this material offers excellent fire resistance, the impact resistance was found to be inadequate. The British Midlands 737 event also underscores the need to provide impact resistance for fuel tanks.

In addition, the evolution of airplane structures has resulted in the use of new materials for fuel tank structures. One aspect of these new materials is a possible lessening of their resistance to fire, (e.g. composite horizontal stabilizer fuel tanks).

Based upon the use of new materials and the need to assure fuel tank integrity from both fire and impact damage, the FAA position is that the current FAR 25.963 requirement for

the fuel tank access panels to be impact and fire resistant should be applied to the entire external surfaces of the fuel tank. The harmonized rule should not reduce the current level of safety and allow use of doors made of materials that do not meet fire resistance standards, as defined in FAR/JAR Part 1. The FAA intends to apply special conditions to future airplane designs requiring that both impact resistance and fire resistance are addressed on fuel tanks located in the wing and stabilizer, etc. so that the level of safety achieved by the current transport fleet is not inadvertently reduced by introduction of newer technology materials, or the evolution of airplane designs such as the "Sonic Cruiser".

From: Mike.Dostert@faa.gov
To: frederick.a.lewis-smith@boeing.com; olivier.grimaud@airbus.aeromatra.com; OTTRIA_Edmond@sfact.dgac.fr; patrick.zaccaria@airbus.aeromatra.com
cc: alan.o.macias@boeing.com; anne.jany@airbus.fr; braulio.medeiros@embraer.com.br; brian.handley@rolls-royce.com; carlos.vieira@embraer.com.br; clifford.m.schjoneman@boeing.com; geoffrey.armstrong@notes.canadair.ca; gruz_laurent@sfact.dgac.fr; hamerm@tc.gc.ca; hans-dieter.hansen@airbus.dasa.de; jean-claude.nanche@airbus.fr; ji.paik@embraer.com.br; joe.sikora@boeing.com; johann.hervault@airbus.aeromatra.com; john.l.doherty@boeing.com; kenneth.b.dunkelberg@boeing.com; krijn.pellen@rolls-royce.com; lonnie.richards@bae.co.uk; mbowser@dehavilland.ca; pierre-emmanuel.arnaud@airbus.aeromatra.com; robert.mather@pwc.ca; robin.boning@srg.caa.co.uk; sarah.knife@ae.ge.com; stadmef@pweh.com; stuart.browning@hs.utc.com; virtuej@pweh.com; wmiles@cessna.textron.com; youngml@pweh.com; George.Soteropoulos@faa.gov; Mike.McRae@faa.gov; Rich.Yarges@faa.gov; Lanny.Pinkstaff@faa.gov; Neil.Schalekamp@faa.gov;

Subject: Re:FW: Fuel Tank Access Covers

Andy,

In 1998 and 1999 there was much correspondence from Phil Sallee, Robin Boning and myself regarding this issue. I have scanned copies of the info, attached. The bottom line: the FAA position was that the current fire resistance requirement was in deed a requirement in the FAA rule and that we would not agree to lessen the requirement. In fact we wanted to apply the same standard to the rest of the wing (you can read the 1999 e-mail for more details) but felt it was outside the harmonization effort. Phil suggested the structures group had two options. Enveloping the JAA and FAA requirements, or writing a report with an FAA minority position and sending it to the TAEIG (I don't know if the group chose to take Phil's advice to document the FAA "minority" opinion, I have not seen it if they did.) Enveloping would include adopting the FAA requirement for fire resistance, using the structures FAR 1 definition of equivalence to aluminum (not the propulsion standard of 5 minutes at 2000 degrees, requiring extensive testing as Robin seems to imply in his message). The intent of the FAA rule was to ensure the doors would remain intact in a ground fire condition. The assumed wing construction at the time the rule was developed was aluminum. New materials are being used for fuel tanks (composite stab tanks) so the rule should be updated to include a minimum fire resistance standard for the wing as well as the current requirement for the doors. The Concorde accident only highlights the need to consider fire resistance and impact resistance for the other portions of the wing, not just the access panels. Applying the standard to the remainder of the wing or fuel carrying portions of the airplane that would be exposed to a ground fire condition would require re-tasking the ARAC group, but this is what should

be done. The FAA may address this issue via an issue paper on certification projects if it is considered an unsafe condition.

The ARAC structures group version of the rule has been routed within the FAA and is not acceptable. At this time we do not plan on publishing the proposed ARAC version of the rule so I would suggest the NPA not be released.

The FAA propulsion position has remained unchanged since 1999. We do not intend to lessen the level of safety by eliminating our requirement for fire resistance of fuel tank access panels.

Regards, Mike Dostert

From: Mike Dostert [Mike.Dostert@faa.gov]

Sent: Friday, January 04, 2002 9:05 AM

To: Wim.Doeland@RLD.minvenw.nl; robin.boning@srg.caa.co.uk

Cc: ken.fontaine@srg.caa.co.uk; peter.hayward@srg.caa.co.uk; frederick.a.lewis-smith@boeing.com; olivier.grimaud@airbus.aeromatra.com; Rich.Yarges@faa.gov; rory.martin@srg.caa.co.uk; Kasowski, Andy; anne.jany@airbus.fr; bert.hischemoeller@brr.de; clifford.m.schjoneman@boeing.com; f.sepe.rai-enac@interbusiness.it; georg.krook@faidor.de; hans-dieter.hansen@airbus.dasa.de; jean-claude.nanche@airbus.fr; gruz_laurent@sfact.dgac.fr; lgruz@aol.com; manfred.fiedler@lba.de; mike.bayley@baesystems.com; Serge.BRUN@dassault-aviation.fr; staffan.jonsson@fltsafety.lfv.se; wim.overmars@fokkerservices.storkgroup.com; Mike.McRae@faa.gov; Neil.Schalekamp@faa.gov; Rich.Yarges@faa.gov

Subject: Re:FUEL TANK ACCESS COVERS

Robin,

You are likely tired of hearing from me on this issue, but in reading your message I feel the FAA position in not understood. The following is offered to help clarify our position.

I do not view the FAA position as raising the safety bar or imposing new requirements. My earlier correspondence on this issue discussed several events where large under wing ground fires occurred. In one case a large fire occurred on an airplane that incorporated "new technology" nylon access panels that had been introduced into the 747 fleet as a product improvement for weight savings (circa 1970s). The doors nearly melted out which would have release large quantities of fuel. The FAA initiated AD action to eliminate nylon fuel tank access panels from the 747 fleet. The requirement for fire resistance was subsequently incorporated into the FARs. I do not believe additional justification for the FAA requirement for the access panels to be fire resistant is needed. (I have attached a copy of a picture from the New Delhi event for your view)

I do not recall any agreement between the FAA and JAA propulsion community regarding allowing the fire resistance of access panels to be equivalent to the surrounding structure. Phil Salles' message to the structures group indicates the PPIHWG recognition of the FAA "minority position". I think a note of clarification regarding the FAA AC is also needed. The AC does state that the doors need not be more fire resistant than the surrounding tank structure. This statement was based upon the assumption of aluminum wing construction therefore the thought was that all doors would be meet the part 1 fire resistance requirement. Use of composite tank walls was not envisioned. It should be

noted that you cannot do rulemaking by AC therefore, this statement cannot be used to allow use of materials that would not meet the minimum fire resistance requirement in the rule itself.

With regard to my position that other fuel tank surfaces need to be addressed in future ARAC tasking (new rulemaking): Looking back we see good experience from wings constructed of aluminum. (This is why you do not see any recommendation from accident investigators in the two events you noted in your message.) The FAA access panel fire resistance requirement is based upon the FAR part 1 definition, requiring only that the panels be equivalent to aluminum. Not the traditional 2000 degree 5 minute burner test used by the propulsion community.

It is not my intention to require all fuel tanks exposed to ground fire meet a 2000-degree fire for 5 minutes. It is my intention to insure that access panels have fire resistance equivalent to aluminum so that the current level of safety is maintained.

Based upon the introduction of new technology materials in fuel tank construction, we need to look forward and be cognizant of possible adverse impacts on safety. As you know the public has accused the FAA of looking back to make safety improvements, sometimes referred to as "tombstone mentality." Waiting for adverse service experience and recommendations for change from accident investigators is not the way we should be doing our job as an industry.

Manufacturers have started to use composites for tank walls located outside the fuselage where post crash ground fire is a serious safety concern. The intention of the FAA position is that the new tanks provide an equivalent level of protection from post crash ground fire and underwing fires as the current fleet of aluminum tanks.

While the Concorde accident was not caused by fire damage, it was caused by damage to the fuel tanks that were made of 1.2 mil thick titanium. The wing construction on the Concorde is unique relative to typical commercial transports. The Sonic cruiser (if ever built) will likely have a delta wing with similar construction. Both impact resistance and fire resistance are considerations for new technology airplane designs where use of new materials and configuration differences may cause reduced fuel tank safety. Our goal, as a minimum, should be to maintain the current level of fuel tank integrity.

Regards, Mike Dostert

Subject: Fuel Tank Access Panel Fire Resistance
Author: Mike Dostert at ANM100
Date: 5/21/1999 2:03 PM

Robin, Our Airframe engineers are working toward harmonization of the standards for fuel tank access panels. I was given a copy of your FAX dated May 5, 19999 to Phil Sallee. I would like to clarify the FAA position regarding this regulation.

Background:

These standards came about due to in-service problems (incidents/accidents) where fuel tank panels constructed of nylon were severely damaged by fire. Early in the 747 program a weight savings was implemented that changed all doors from cast aluminum to nylon. Several events resulted in underwing fires and damage to the doors. On December 18, 1970 Boeing Service bulletin 747-57-2035 was issued. The reason stated in the bulletin was "Fuel tank access holes on the wing lower surface have molded plastic access doors. In one instance following an engine fire, two of the access doors adjacent to the engine showed evidence of heat damage but no fuel leakage. However, it has been determined that prolonged exposure to a fire could cause sufficient damage to the plastic doors to allow fuel leakage." Doors near the engines were changed to aluminum type. While I was working for Boeing I personally viewed pictures of the lower wing skin following the fire noted in the bulletin. I would conclude as the bulletin writer did that the nylon panels were close to failure. Amendment 25-23, 1970, introduced the requirement in 25.867 that "(a) surfaces to the rear of the nacelles, within one nacelle diameter of the nacelle centerline, must be at least fire resistant."

In 1979 the FAA issued AD 79-20-11 that mandated incorporation of the service bulletin noted above and also replacement of the remaining nylon doors. This AD resulted from the Iranian Tanker 747 accident investigation which showed that the nylon doors provided and opening for the creation of arcs during a lightning strike. Service bulletin 747-28-2084 stated "Installation of aluminum fuel cell access doors precludes induced voltages due to lightning strike to the airplane." Results of testing conducted by Boeing showed that arcing to the wing skin from surge tank drain lines that were routed near the door opening could occur.

I would also like to bring your attention to two non-fatal accidents that would likely have been much more serious if fuel tank access panel failure occurred. In 1970 a 747 landing in New Delhi experienced engine mount failure that allowed a fuel leak and large underwing fire. Another case occurred in March of 1994 when a 747 landing in Tokyo experienced a similar problem. In both cases large underwing fires occurred resulting in major damage to the wing. Nylon doors would likely have failed and allowed all fuel in the tank to be added to the fire or allowed a tank explosion. (The Tokyo event caused a

fire that was intense enough to ignite the tank. It listed in the ARAC report on fuel tank explosions, the tank ignited internally but did not cause overpressure)

Discussion:

While the current FAA standard was written to address typical wing construction using aluminum, the safety concern and need for a fire resistance standard has not changed by the introduction of wing surfaces that may not be fire resistant. From what I have been told, changes to the standard of fire resistant have been proposed by the FAA rep, which included fire resistant or fire resistance equivalent to the adjacent wing/fuel carrying tank surfaces.

This would seem to be a realistic standard that accounts for fuel tanks constructed of less fire resistant materials. Although the current rule may not be perfect, the need to retain fuel in the fuel tanks and limit the size of a fire is clear. A small fire with limited fuel may be of little consequence, whereas a small fire that has additional fuel from the fuel tank added would likely be hazardous.

One might argue that all tank surfaces should be fire resistant to address post crash ground fire and underwing fire concerns. However, we are harmonizing, not trying to mandate new standards. I believe the FAA proposal provides a practical regulation that can and has been met, and allows harmonization. The FAA does not intend to withdraw our fire resistance standard, and in the spirit of enveloping the more stringent would be adopted.

I hope the above background and discussion helps to understand why we have a standard and why we would not be receptive to withdrawing of the current requirement.

Regards, Mike Dostert

Attachment B

Supplemental Data – Fuel Tank Access Cover Fire Resistance

PPSG Background Data

From: Doeland, Wim (DL)(IVW) [Wim.Doeland@ivw.nl]

Sent: Tuesday, February 18, 2003 7:11 AM

To: Kasowski, Andy; Blacklay, Edward (Ted); Collins, Richard; Comino, Georgio; Doeland, Wim (DL)(IVW); Eastin, Robert; Hoggard-Jr., Amos; LaFosse, Bertrand; Martin, Rory; Newman, Philip; Pereira, Humberto; Pinsard, Laurent; Reid, Mike; Schmidt-Brandecker, Bianka; Smith, Johnny; Yarges, Rich

Subject: RE: GSHWG AI 33-6 & 33-7

Andy,

The JAA has decided to go ahead with the full NPA 304, so including resistance to fire (and impact resistance) for the access covers. Since we have no requirement or guidance on resistance to fire for access covers today in JAR-25 it was felt that including unharmonised material in JAR-25 was the preferred option instead of having nothing at all and wait for future harmonisation on this subject.

This decision was discussed by SStG, PPStG and JAA/HQ and all agreed. Of course, the GSHWG could still recommend differently (i.e. not to adopt fire resistance). But maybe you want to point out in your letter to TAEIG that the above decision was taken, just to get the full picture.

Regards,

Wim

Subject: FUEL TANK ACCESS COVERS
Author: robin.boning@srg.caa.co.uk
Date: 1/3/2002 10:59 AM

Wim,

This seems to be an issue where technical differences exist between JAA (PPSG) and the Powerplant community in the FAA. I had thought that we had reached a compromise, based upon the current FAA rule and AC, which collectively do not require the access covers to be more resistant to fire than the basic wing structure. However, it appears that this is no longer acceptable to Mike Dostert.

Re:FW: Fuel Tank Access Covers

I do not propose to reiterate all the arguments again, but my main point might be that, Mike's informal E-mail messages apart, I have not seen any formal recommendation for access covers/all wing structure to be Fire Resistant.
- The original NPRM (88-10) for fuel tank access panels (covers) offered no justification as to why the covers should be Fire Resistant.
- Following the 'Manchester' accident, the Accident Investigators recommended the adoption of impact resistant standards for fuel tank access covers; no comment or recommendation was made for these covers to be Fire Resistant.
- The introduction of the 25.867 requirement for 'surfaces behind engines' to be resistant to fire did not consider that other parts of the wing were at risk i.e. no resistance to fire standard was required for access panels or for other surfaces.
- Although the tragic Concorde accident resulted from 'lack of impact resistance', there: (i) has been no Accident Investigator recommendation (so far) for 'fire resistance', (ii) the modification to the fuel tanks was not required, nor met any defined level of resistance to fire. I am not in favour of citing this accident as reason, or justification for additional requirements to aircraft which have totally different types of construction.
- Mike mentions two accidents - 747/New Delhi and 747/Tokyo - but I have not seen any recommendations from Accident Investigators.

Having said that, I can confirm that the PPSG still support the philosophy of P-NPA 25E-304 - "The P-NPA involves two subjects which have been of particular long term interest to PPSG members: (i) fuel tank integrity, close to the fuselage and engines and (ii) fire resistance of fuel tank covers. The P-NPA addresses both of these issues in a manner acceptable to the PPSG."

We will be prepared to discuss further if this Harmonised proposal is not acceptable to the FAA, but I am sure that our main concern will remain – not to introduce new requirements, which have not been adequately justified.

Best Wishes for the New Year.

Robin

From: Boning Robin

Sent: 07 September 1999 17:24

To: 'THADDEE'
Cc: Fontaine Ken; 'boltcr@pweh.com'; Blacklay Ted; James Stephen; 'ANNE'; 'BERT'; 'CLAUDE'; 'ERIC'; 'FRANK'; 'GEORG'; 'HANS-DIETER'; 'LAURENT'; 'MANFRED'; 'MIKE'; 'OLIVIER'; 'STAFFAN'; 'WIM'; 'Sallee, George P'; 'TCHAVDAROV'

Subject: FAR/JAR 25.963 HARMONISATION

To: T Sulocki, JAA
c.c. J-C Tchavdrov, Airbus; G P Sallee, Boeing; C R Bolt; E H Blacklay, CAA; J K Fontaine, CAA; S L James, CAA; PPSG Members

Reference: PPSG 99/12/RWB
7 September 1999

FAR/JAR 25.963 HARMONISATION

1. We have been discussing this subject for some considerable time now and the PPSG position has been well documented. Our E-mail message (PPSG 99/04/RWB), dated 17 May 1999 gave the reasons why we were not in favour of adopting a 'Fire Resistant' standard for fuel tank access covers.
2. However, we have now entered the final phase of Harmonisation activity as evidenced by the 'Better Plan' proposals, agreed during the FAA/JAA Conference in June 1999 and every effort needs to be made to finalise this activity.
3. The PPSG has been advised of proposals for changes to the FAR 25.963(e)(2), which would make it clear in the Requirement that: " ... the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material". This would overcome one of the PPSG objections, which was that it is not acceptable for the Advisory Material to lessen the intent of the requirement (Reference: Current FAR 25.963(e)(2) and AC 25.963-1).
4. The PPSG members have been informed about this proposal together with the suggestion that we adopt it for JAR-25 as well. To date, I have received no objections and have received a number of messages of support.
5. This message therefore confirms that the PPSG agree in principle that this proposal should be acceptable for adoption into JAR-25, without prejudice to its earlier views. We would, of course, wish to review and be able to comment on, the whole rule/AC proposal package.

Please keep us informed.
Regards
R W BONING
JAA PPSG Chairman

From: Boning Robin

Sent: 17 May 1999 11:30

To: 'Sallee, George P'; 'TCHAVDAROV'
Cc: Fontaine Ken; Lancaster, Herbert L; 'tsulocki/jaahq/nl@jaa.nl'; 'boltcr@pweh.com'; Blacklay Ted; James Stephen; ANNE; BERT; CLAUDE; ERIC; FRANK; GEORG; HANS-DIETER; LAURENT; MANFRED; MIKE; OLIVIER; STAFFAN; WIM

Subject: RE: 25.963 HARMONISATION

To: G P Sallee, Boeing

c.c. J-C Tchavdrov, Airbus; T Sulocki, JAA; C R Bolt; H L Lancaster; E H Blacklay, CAA; J K Fontaine, CAA; S L James, CAA; PPSG Members

Reference: PPSG 99/04/RWB
17 May 1999

FAR/JAR 25.963 HARMONISATION

1. Thank you for the letter, dated 4 May 1999, continuing with the subject of Fuel Tank Access Covers and the question of compliance with FAR 25.963(e)(2).
2. You raise an interesting issue with regard to 25.867(a), where, within one nacelle diameter, there is a requirement for surfaces to the rear of the nacelles to have a resistance to fire capability. This is another disharmony, where JAA has substituted the phrase: " ... constructed of materials at least equivalent in resistance to fire as aluminum alloy in dimensions ...", in place of the FAA version which says " ...must be at least fire-resistant".

NOTE: In NPA 25D-181, JAA deleted all reference to the term 'Fire Resistance' from all requirements, which did not relate directly to the Designated Fire Zones or the boundaries to these zones.

3. This is a difference, which is easy to miss, since JAR-25 does not show the normal underlining for FAR / JAR differences. Thaddee to note for Change 15!
4. FAR/JAR 25.867(a) can clearly apply to wing surfaces, including fuel tank access covers, where there are wing mounted engines. Within the one nacelle diameter, FAR/JAR 25.867(a) requires all surfaces to meet the 'resistance to fire' standard, but this 'resistance to fire standard' is not applied to the whole wing surface, only that part, which is behind the powerplant. Therefore the clear implication is that, there is a conscious agreement not to require this standard to apply to the whole wing.
5. Unless there is proper discussion and agreement that there is a need to introduce a resistance to fire standard for the wing as a whole, JAA will continue to resist the introduction of such a requirement for fuel tank access covers alone. When the PPSG was consulted on the options given in your letter, there was one industry reply saying that Option 3 in your letter ('covers to resist fires as well as adjacent structure') could be lived with, but I can only conclude that this is a decision taken in the spirit of Harmonisation!
6. For PPSG as a whole, the position has been, for many years, that this requirement is not necessary. Therefore Option 1 ('delete FAR 25.963(e)(2)) is the appropriate one for us, with

Option 6 ('majority and minority positions to be presented') as a fallback position. I find it hard to accept the idea of Option 3 ('enveloping'), where the more severe requirement is both technically and administratively flawed. The PPSG position in support of Option 1 is summarised below.

The Harmonised §25.963 should not include any requirement for Fire Resistant fuel tank access covers for the following reasons:

- No clear justification has been seen for the fuel tank access covers to be Fire Resistant. In the air, §25.867(a) provides the necessary resistance to fire from the (most probable) powerplant fire threat; for the ground crash-worthiness case, any exposure of the wing and the covers to fire, almost certainly means that the tank has released fuel already. Any benefit for Fire Resistance is not easy to see.
- Although the 'Manchester' accident report recommended adoption of impact resistance standards for fuel tank access covers, there was no recommendation for Fire Resistance of these covers.
- The principle of AC 25.963-1, in allowing the covers to only be as resistant as the rest of the wing, is administratively flawed and exposes the position that there is no general need for wing surface Fire Resistance.
- §25.867(a) also confirms that there is no requirement for wings to be Fire Resistant.
- If 'Fire Resistance' was implemented in any meaningful way, the burden for the industry could be huge.
- If however, we impose the requirement and then do not apply it, we belittle our efforts and make it harder to apply the requirements in which we do believe.
- If the FAA cannot justify compliance with the existing rule (and their AC 25.963-1 shows that they cannot), they should consider how a rule can be deleted without giving the appearance of reducing safety.

I hope that the above points can be used constructively to come to a conclusion on this subject.

Regards

R W BONING
JAA PPSG Chairman

4 May 1998

To: R.W. Boning Chairman -PPSG

CC: T. Sulocki, C. Bolt, H. Lancaster

Reference: Your Letter of 23 April 1999

Subject: FAR/JAR 25.963(e) Harmonization - Fuel Tank Access Covers Fire Resistance

Dear Robin;

I have reviewed your letter, referenced above, providing the Power Plant Study Group (PPSG) position on the FAR 25.963(e)(2) requirement that fuel tank access covers be fire resistant.

* I agree with PPSG, there is nothing in the FAR or JAR that requires fuel tanks to be fire resistant.
* I agree that the requirements of the FAR 25.963(e)(2) should not be increased or decreased by the associated AC (which the AC does).
* My understanding of regulatory history is that the FAR fire resistant fuel tank access cover requirement did result from the Manchester event because plastic fuel tank access covers were being used and had melted. I tend to agree that this melting was probably not a significant contributing factor to the actual outcome
* I agree that the safety benefit associated with fire resistance fuel tank covers has not been reported, at least to my knowledge, and I suspect that the FAA sees no need to justify their position or the rule.
* However, the requirements of FAR 25.867(a) would seem to require fire resistant fuel tanks and access covers within one nacelle diameter area for close wing mounted engines.
* Lastly, it is my perception that given aluminum wing structures, fuel tank access covers made of aluminum (with impact resistance similar to the adjacent wing structure) and the FAR -1 definition for "fire resistant", the "fire resistant fuel tank access cover" requirement has not produced a significant burden.

The task, which I have been asked to help mediate, is to harmonize the 25.963(e) requirements. At the current stage, with the significant disagreement over the fuel tank access cover fire resistant requirement, a consensus position is impossible. I see six options:

1. Accept the 25.963(e) rule without subparagraph (2), which is unacceptable to the FAA. (The FAA considers this approach to have the appearance of reducing safety.)
2. Accept 25.963(e)(2) as written, which is unacceptable to JAA/PPSG positions.
3. Revise the text of the 25.963(e)(2) rule to read, "All covers must resist the effects of fires at least as well as the adjacent structure" and also delete the associated AC text.
4. Do nothing and let TAEIG management resolve the issue by "enveloping" (the FAA rule would likely survive as the "most severe".).
5. Harmonize - start by a request to the FAA to substantiate the safety benefit. However, I doubt that FAA has data to substantiate a safety benefit or will agree to remove the requirement by the lack thereof.
6. Prepare a "Report" that includes the majority and minority positions and leaves the regulatory decision to Authority Management.

I recommend that PPSG consider the options. Lacking a near term agreement (by end of May), I

suspect that choice (4) could be invoked by TAEIG. I personally favor option (3) but I would also remind TAEIG that: a) no safety benefit has been identified for the fuel tank access cover fire resistant requirement and b) that composite wing structures are under development and that the safety impact of composite fuel tank structures needs to be examined and appropriate fire resistance requirements defined.
I sense that AIA, AECMA and JAA can agree and that the FAA disagreement is based on taking a "policy" position. If option (3) is unacceptable to PPSG and JAA, I recommend option (6), which I interpret to be, write a short report that states in summary that three parties out of four (the majority) agree that the fire resistant fuel tank access cover requirement is not justified by a known safety benefit analysis and that the majority view is to recommend deletion of 25.963(e)(2) requirement. The FAA minority position should be attached as an appendix and the points dispositioned by the majority and the report submitted to TAEIG by end of June 1999. I see no value to be obtained from debating the issues longer.

Regards;

G. P. Sallee
Co-Chair PPIHWG

Attachment C

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

Transport Airplane Directorate
WG Report Format
Harmonization and New Projects

1 - BACKGROUND:

- *This section "tells the story."*
- *It should include all the information necessary to provide context for the planned action. Only include information that is helpful in understanding the proposal -- no extraneous information (e.g., no "day-by-day" description of Working Group's activities).*
- *It should provide an answer for all of the following questions:*

a. Safety Issue Addressed/Statement of the Problem

(1) What prompted this rulemaking activity (e.g., accident, accident investigation, NTSB recommendation, new technology, service history, etc.)? What focused our attention on the issue?

Fuel tank access covers have failed in service due to impact with high-speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel that could subsequently ignite. In addition, prolonged exposure to a fire could cause sufficient damage to some fuel tank access cover designs to allow fuel leakage and subsequent ignition. As a result the FAA adopted a change to FAR §25.963 through Amendment 25-69 (reference Federal Register Vol. 54, No. 188, 29 September 1989) to require impact and fire resistant fuel tank access covers on all transport category aircraft. FAA advisory material for fuel access panel impact and fire resistance was adopted in 1992 in the form of AC 25.963-1 (reference Federal Register Vol. 56 No. 115, 14 June 1991). The JAA adopted fuel access panel impact requirements and advisory material through NPA 25C-249, incorporated into the JAR at Change 14. Due to concerns expressed by the PPSG in response to the original NPA 25C-249 which included fire resistance requirements for fuel access covers, no fire resistance requirements were included in the final release of the NPA.

ARAC tasked the General Structures Harmonization Working Group to harmonize CFR 14 §25.963(e), Fuel tanks – general, with the corresponding requirement in JAR §25.963(g). In addition, the GSHWG was tasked to review and develop harmonized advisory material based on existing guidance presented in AC25.963-1 and ACJ 25.963(g).

(2) What is the underlying safety issue to be addressed in this proposal?

The safety issue to be addressed is that of fuel tank access panel integrity in the presence of high speed objects such as tire tread material and/or engine debris following engine failures and in the presence of elevated temperatures due to landing gear and engine fires.

(3) What is the underlying safety rationale for the requirement?

Certain fuel tank access covers, typically on the lower side of the wing surface, are susceptible to impact from high-speed objects such as failed tire tread material and engine debris following engine failures. In addition, certain fuel tank access covers due to their close proximity to landing gear and engines, may be subjected to elevated temperatures due to landing gear or engine fires. Failure of an access cover on a wing fuel tank as a result of impact damage or elevated temperatures from close proximity to a fire source may result in the loss of hazardous quantities of fuel that could subsequently ignite.

(4) Why should the requirement exist?

To minimize the possibility of the loss of hazardous quantities of fuel through access covers impacted by high speed objects such as failed tire tread material and engine debris following engine failure or elevated temperatures as a result of close proximity to a heat source such as landing gear or engine fires.

b. CURRENT STANDARDS OR MEANS TO ADDRESS

(1) If regulations currently exist:

(a) What are the current regulations relative to this subject? (Include both the FAR's and JAR's.)

FAR §25.963(e)(1) and JAR §25.963(g)(1) are identical.

FAR §25.963(e)(2) requires fuel tank access covers to be fire resistant. There is no such requirement in JAR-25. This results in additional compliance demonstration for FAR 25 compared to JAR-25.

Current CFR 14 Part 25 text:

FAR §25.963 Fuel tanks: general

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

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

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

(Amendment 25-69, 54 FR 40354, Sept. 29, 1989)

AC 25.963-1 dated 7/29/92

1. PURPOSE
This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of FAR §25.963(e).

2. RELATED FAR SECTIONS
The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with FAR §25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of FAR §25.963(e).

3. BACKGROUND
Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE
a. All fuel tank access covers must be designed to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimize penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the airplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.
b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.
(1) Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass traveling at airplane rotation speed (V_R), and distributed over an impact area equal to 1 1/2 percent of the total tread area.

(2) For turbine powered airplanes, covers located within 15 degrees forward of the front engine compressor or fan plane measured from center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from center of rotation, should be evaluated for impact from small fragments (shrapnel) with energies referred to in AC 20-128, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure, issued 3/9/88. The covers need not be designed to withstand impact from high energy engine fragments such as engine rotor segments or propeller blade fragments.

5. FIRE RESISTANCE
a. All fuel tank access covers must be fire resistant. The definition of fire resistant, as given in Part 1 of the FAR, means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used. For the purpose of complying with this requirement, the access cover is assumed to be subjected to fire from outside the fuel tank. The fuel tank access covers need not be more fire resistant than the contiguous tank structure.
b. Access covers, not as fire resistant as contiguous tank structures, should be tested for five minutes using a burner producing a 2000°F. flame. The test burner and procedures for instrumentation and calibration should be as defined in AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/6/90. The test cover should be installed in a test fixture representative of the actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

Current JAR text: (Amendment 93-1 to Change 13)

JAR §25.963 Fuel tanks: general

(g) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris.
(2) Reserved
(See ACJ 25.963(g))

ACJ 25.963(g)

Fuel Tanks: General (Acceptable Means of Compliance)
See JAR §25.963(g)
1. *Purpose.* This ACJ sets forth an acceptable means of showing compliance with the provisions of JAR-25 dealing with the certification requirements for fuel tank access

covers. Guidance information is provided for showing compliance with the impact resistance requirements of §25.963(g).

2. *Background.* Fuel tank access covers have failed in service due to impact with high speed objects such as failed tyre tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

3. *Impact Resistance*
a. All fuel tank access covers must be designed to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should however, choose to "minimise penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the aeroplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.
b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.
i. Covers located within 15° inboard and outboard of the tyre plane of rotation, measured from the centre plane of tyre rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tyre tread segments having width and length equal to the full width of the tread, with thickness of the full tread plus casing. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground. Generally, this will be the higher of the aircraft rotation speed (Vr) and the flapless landing speed.
ii. Covers located within 15° forward of the front compressor or fan plane measured from the centre of rotation to 15° aft of the rearmost turbine plane measured from the centre of rotation, should be evaluated for impact from small fragments (shrapnel). The covers need not be designed to withstand impact from high energy engine fragments such as rotor segments."

Note: FAR 121.316 requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of §25.963(e). This requirement however was considered to be beyond the scope of the tasking to the GSWHG, and has therefore not been discussed. JAR-26 currently does not contain an equivalent retro-active requirement.

(b) What has occurred since those regulations were adopted that has caused us to conclude that additional or revised regulations are necessary? Why are those regulations now inadequate?

Harmonization of the requirement would benefit the OEMs and certification authorities. The proposal contained herein is intended to achieve common requirements and

interpretative material related to impact requirements for fuel tank access covers, without reducing the safety provided by the regulations below the level that is acceptable to Authorities and Industry.
Harmonisation of JAR-25 and FAR 25 on this subject would yield cost savings by eliminating duplicate certification activities.

2. If no regulations currently exist:

(a) What means, if any, have been used in the past to ensure that this safety issue is addressed? Has the FAA relied on issue papers? Special Conditions? Policy statements? Certification action items? Has the JAA relied on Certification Review Items? Interim Policy? If so, reproduce the applicable text from these items that is relative to this issue.

Not Applicable

(b) Why are those means inadequate? Why is rulemaking considered necessary (i.e., do we need a general standard instead of addressing the issue on a case-by-case basis?)

Not Applicable

2. DISCUSSION of PROPOSAL

- *This section explains:*
- → *what the proposal would require,*
- → *what effect we intend the requirement to have, and*
- → *how the proposal addresses the problems identified in Background.*
- *Discuss each requirement separately. Where two or more requirements are very closely related, discuss them together.*
- *This section also should discuss alternatives considered and why each was rejected.*

a. SECTION-BY-SECTION DESCRIPTION OF PROPOSED ACTION

(1) What is the proposed action? Is the proposed action to introduce a new regulation, revise the existing regulation, or to take some other action?

The proposed action for the rule is to retain the harmonized wording of FAR §25.963(e)(1) / JAR §25.963(eg)(1). In addition, since harmonization could not be reached in regard to requirements for fire resistance, the rule text for FAR §25.963(e)(2) is to be retained and the fire resistance requirements developed by the group no

requirements for fire resistance will be incorporated into the JAR in a new sub-paragraph 25.963(e)(2).

In the advisory material, for tire debris, harmonization is achieved by adopting the current AC 25.963-1 guidance on tire fragment spread angle and mass, but adopting the current ACJ 25.963(g) guidance of tire fragment speed. For engine debris, harmonization is achieved by adopting an additional definition of engine debris to be used in the absence of relevant data.

In addition, since harmonization could not be reached in regard to requirements for fire resistance, the advisory text of AC 25.963-1 in regard to fire resistance is to be retained and the no guidance developed within the group in regard to fuel access cover fire resistance will be incorporated into the JAR advisory material of ACJ 25.963(eg).

(2) If regulatory action is proposed, what is the text of the proposed regulation?

FAR §25.963 Fuel tanks: general

(e) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris.
(2) All covers must be fire resistant as defined in part 1 of this chapter. ***(FAR only)***
(2) All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminium alloy in dimensions appropriate for the purpose for which they are to be used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material. ***(JAR only)***
Note: (e)(2) will not appear in the JAR.

(3) If this text changes current regulations, what change does it make? For each change:

- What is the reason for the change?
- What is the effect of the change?

No changes to current FAR regulation text are proposed. Only changes to advisory material are proposed. The JAR regulations will change in that fire resistance requirements for fuel tank access covers will be added, although different than those of the FAR.

(4) If not answered already, how will the proposed action address (i.e., correct, eliminate) the underlying safety issue (identified previously)?

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

The proposed rule and advisory material both address impact on fuel tank access covers by tire fragments, engine debris, or other likely debris.

The proposed FAR rule and advisory material maintains the previous language and requirements of §25.963(e)(2) and AC 25.963-1 paragraph 5 in regard to fire resistance, although this part of the rule and advisory material will remain un-harmonized with the JAR. The JAR will incorporate the advisory material developed during the group discussions in regard to fire resistance. The FAA, as documented in their comments to NPA 25E-304 which are reproduced below, believes the fire resistance standard developed by the group and being incorporated into the JAR reduces the level of safety currently required by the FAR.

FAA Comments to JAA NPA 25E-304
Fuel Tank Structural Integrity / Fuel Tank Access Covers

Fuel Tank Access Covers

The ARAC recommendation is to incorporate wording directly into the rule (FAR/JAR 25.963(d)) that would allow the fuel tank access panels to be "equivalent to the adjacent / surrounding skin," rather than meet the fire resistant standard stated in the current FAR. This proposal is a step backward in fuel tank safety, particularly in the post crash fire environment.

The current transport fleet post crash safety record is based upon use of aluminum structures. These structures conduct heat well and are "fire resistant" as defined in FAR 1.1. The fire resistance requirement in FAR 25.963 was introduced because of the use of nylon fuel tank access panels by one manufacturer. These panels suffered severe damage when exposed to underwing fires. The doors were replaced with cast aluminum doors to provide appropriate fire resistance. The impact resistance of fuel tank panels made of cast aluminum, however, was found to cause a safety concern. Therefore, the cast aluminum doors were replaced by doors with improved impact resistance in areas of the wing exposed to tire and uncontained engine debris. FAR 25.963 was amended to require both fire resistance and impact resistance for fuel tank access panels. While this rulemaking addressed the adverse service experience of conventional transport airplanes with fuel tank structures that were made of impact and fire resistant aluminum, the FAA did not foresee the future use of composite structures nor possible development of non-conventional delta wing designs that may significantly reduce the inherent safety of conventional fuel tank designs. Looking back, FAR 25.963 should have established an objective standard for fuel tanks integrity for impact and fire resistance.

The Concorde and other accidents have highlighted the safety implications of damage to fuel tanks from debris or fire. The delta wing design of the Concorde allows the use of lower wing skins made of 1.2 mm titanium. While this material offers excellent fire resistance, the impact resistance was found to be inadequate. The British Midlands 737 event also underscores the need to provide impact resistance for fuel tanks.

In addition, the evolution of airplane structures has resulted in the use of new materials for fuel tank structures. One aspect of these new materials is a possible lessening of their resistance to fire, (e.g. composite horizontal stabilizer fuel tanks).

Based upon the use of new materials and the need to assure fuel tank integrity from both fire and impact damage, the FAA position is that the current FAR 25.963 requirement for the fuel tank access panels to be impact and fire resistant should be applied to the entire external surfaces of the fuel tank. The harmonized rule should not reduce the current level of safety and allow use of doors made of materials that do not meet fire resistance standards, as defined in FAR/JAR Part 1. The FAA intends to apply special conditions to future airplane designs requiring that both impact resistance and fire resistance are addressed on fuel tanks located in the wing and stabilizer, etc. so that the level of safety achieved by the current transport fleet is not inadvertently reduced by introduction of newer technology materials, or the evolution of airplane designs such as the "Sonic Cruiser".

(5) Why is the proposed action superior to the current regulations?

For impact on fuel tank access covers by tire fragments, engine debris, or other likely debris, the proposed rule and advisory material will maintain the tire fragment mass but increase the spread angle and fragment speed to be considered, compared to the current FAR standard. These adjustments were made based on a rational review of in-service data. The net result is to increase the energy level specified for current FAR standards. These energy levels have been reviewed by the authorities and found to be acceptable as to level of safety.

The current fire resistance requirements in the FAR are maintained, although they remain un-harmonized with the JAR.

b. ALTERNATIVES CONSIDERED

(1) What actions did the working group consider other than the action proposed? Explain alternative ideas and dissenting opinions.

Adoption of the current guidance contained in ACJ 25.963(g) on tire fragment size has been considered, but could not be supported by in service data. Based on data from a tread survey performed by Boeing (1985 -1987) it was determined that the tyre debris model contained in the existing ACJ 25.963(g) is too conservative in terms of tyre debris weight. An important additional consideration is that the tyre debris model of AC 25.963-1 has been applied for many years to the current fleet of large/transport aeroplanes, and it is

the opinion of the GSHWG that the application of this model has provided an adequate level of safety. Hence this tyre debris model is proposed in favour of the tyre debris model contained in the existing ACJ 25.963(g).

The velocities used in the tyre debris assessment is proposed as the highest speed that the aircraft is likely to use on the ground under normal operation, in lieu of the text of the existing ACJ 25.963(g) ("the higher of the aircraft rotation speed V_R and the flapless landing speed"). The GSHWG has determined that the probability of occurrence of a flapless landing is sufficiently low to no longer consider the flapless landing speed in the tyre debris assessment.

In addition, the following draft rule and advisory text was developed to address the fuel tank access panel fire resistance requirements currently specified in FAR §25.963(e)(2) and AC25.963-1 paragraph 5.:

Draft Rule Text for Fuel Access Cover Fire Resistance

All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminum alloy in dimensions appropriate for the purpose for which they are used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material.

Draft Advisory Material for Fuel Access Cover Fire Resistance

RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of §25.963(e)(2) if they are fabricated from solid aluminum or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Power plant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminum alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as the minimum thickness of the surrounding wing structure.

c) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or-ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5

minutes. The test cover should be installed in a test fixture representative of actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or distortion that would lead to fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

However, based on objections raised by regulatory sources outside the working group, harmonization could not be achieved. Initial objections to any fire resistance requirements for fuel access covers were received from the PPSG, citing a lack of justification for fire resistant fuel tank covers and questioning the benefits of requiring access covers to be as resistant to fire as the contiguous wing structure, when there is no resistance to fire standard required for the wing itself. After additional discussions, a compromise to the draft harmonized text was developed which was acceptable to the PPSG. Subsequently, the FAA has objected to the draft harmonized text, stating that the proposed text would be a reduction in the level of safety currently required by the FAR. In their objection, the FAA cite the intent of the existing FAA rule is to ensure the fuel access covers would remain intact in a ground fire condition with the assumed wing construction being aluminum. Further, the FAA believe that current rules should be updated to include a minimum fire resistance standard for the fuel tank as well as the current standard for the fuel access covers, but realize this is outside the charter of this harmonization task and would therefore require re-tasking by ARAC. Therefore, the recommendation from the GSHWG is to remain un-harmonized on this issue and refer it back to the TAEIG for disposition and/or re-assignment. Subsequently, the JAA has decided to adopt the fire resistance requirements and guidance material developed by the group into the JAR, reference NPA 25E-304.

(2) Why was each action rejected (e.g., cost/benefit? unacceptable decrease in the level of safety? lack of consensus? etc.)? Include the pros and cons associated with each alternative.

See discussion above.

c. HARMONIZATION STATUS

(1) Is the proposed action the same for the FAA and the JAA?

Yes, in regard to fuel access cover impact requirements. As discussed above, the fire resistance requirements for fuel access covers will remain un-harmonized.

(2) If the proposed action differs for the JAA, explain the proposed JAA action.

The JAA are proposing to adopt the harmonized rule and advisory material text drafted by the GSHWG in regard to fuel access cover impact and fire resistance requirements

through NPA 25C-304. No requirements for fuel access cover fire resistance will be incorporated into the JAR at this time.

(3) If the proposed action differs for the JAA, explain why there is a difference between FAA and JAA proposed action (e.g., administrative differences in applicability between authorities).

Based on objections raised by regulatory sources outside the working group, harmonization could not be achieved. Initial objections to any fire resistance requirements for fuel access covers were received from the PPSG, citing a lack of justification for fire resistant fuel tank covers and questioning the benefits of requiring access covers to be as resistant to fire as the contiguous wing structure, when there is no resistance to fire standard required for the wing itself. After additional discussions, a compromise to the draft harmonized text was developed which was acceptable to the PPSG. Subsequently, the FAA objected to the draft harmonized text, stating that the proposed text would be a reduction in the level of safety currently required by the FAR. In their objection, the FAA cite the intent of the existing FAA rule is to ensure the fuel access covers would remain intact in a ground fire condition with the assumed wing construction being aluminum. Further, the FAA believe that current rules should be updated to include a minimum fire resistance standard for the fuel tank as well as the current standard for the fuel access covers, but realize this is outside the charter of this harmonization task and would therefore require re-tasking by ARAC. Therefore, the recommendation from the GSHWG is to remain un-harmonized on this issue and refer it back to the TAEIG for disposition and/or re-assignment.

3. COSTS AND OTHER ISSUES THAT MUST BE CONSIDERED

The Working Group should answer these questions to the greatest extent possible. What information is supplied can be used in the economic evaluation that the FAA must accomplish for each regulation. The more quality information that is supplied, the quicker the evaluation can be completed.

a. COSTS ASSOCIATED WITH THE PROPOSAL

(1) Who would be affected by the proposed change? How? (Identify the parties that would be materially affected by the rule change – airplane manufacturers, airplane operators, etc.)

Most recent new airplane certification programs have been substantiated using an envelope case involving both FAR and JAR standards for fuel access cover impact resistance. Compared to these enveloped standards the level of energy associated with tire fragments would decrease upon adoption of the new proposed standards. This

reduction in energy level is considered acceptable since it is based on the use of rational analysis of in-service data.

The current fuel access cover fire resistance requirements in the FAR are maintained, although they remain un-harmonized with the JAR.

(2) What is the cost impact of complying with the proposed regulation? Provide any information that will assist in estimating the costs (either positive or negative) of the proposed rule.

Comparing the proposal with the current FAR rule and advisory material, no increase or decrease in cost is expected.

b. OTHER ISSUES

(1) Will small businesses be affected? *(In general terms, "small businesses" are those employing 1,500 people or less. This question relates to the Regulatory Flexibility Act of 1980 and the Small Business Regulatory Enforcement Fairness Act of 1996.]*

Small businesses will not be affected.

(2) Will the proposed rule require affected parties to do any new or additional record keeping? If so, explain. *[This question relates to the Paperwork Reduction Act of 1995.]*

No.

(3) Will the proposed rule create any unnecessary obstacles to the foreign commerce of the United States -- i.e., create barriers to international trade? *[This question relates to the Trade Agreement Act of 1979.]*

No.

(4) Will the proposed rule result in spending by State, local, or tribal governments, or by the private sector, that will be $100 million or more in one year? *[This question relates to the Unfunded Mandates Reform Act of 1995.]*

No.

4. ADVISORY MATERIAL

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

a. Is existing FAA or JAA advisory material adequate? Is the existing FAA and JAA advisory material harmonized?

The existing FAA and JAA advisory material is adequate to address the underlying safety concerns, but harmonization in regard to fuel access cover impact damage can only be achieved by adoption of the proposed advisory material presented in subparagraph c below.

The existing FAA advisory material in regard to fuel access cover fire resistance remains un-harmonized with the JAR. Harmonization in regard to fuel access cover fire resistance cannot be achieved until the issue of fire resistance for the fuel tanks in general is addressed through a separate harmonization effort.

b. If not, what advisory material should be adopted? Should the existing material be revised, or should new material be provided?

The harmonized advisory material developed by the GSHWG for fuel access cover impact requirements as presented in subparagraph c below should be adopted.

The existing FAA advisory material in regard to fuel access cover fire resistance remains un-harmonized with the JAR. The JAR will incorporate the advisory material developed during the group discussions in regard to fire resistance.

c. Insert the text of the proposed advisory material here (or attach), or summarize the information it will contain, and indicate what form it will be in (e.g., Advisory Circular, Advisory Circular – Joint, policy statement, FAA Order, etc.)

The following revised guidance material is recommended in regard to fuel access cover impact requirements.

Fuel Tank Access Doors
AC 25.963-1
May 19, 1999

1. PURPOSE. This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of 25.963(e).

2. RELATED FAR SECTIONS. The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with 25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of 25.963(e).

3. BACKGROUND. Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine

failures. Failure of an access cover on a fuel tank may result in loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE.

a) All fuel tanks access covers must be designed to minimise penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimize penetration and deformation" by analysis or test of covers using debris of a type, size, trajectory and velocity that represents conditions anticipated in actual service for airplane model involved. There should be no hazardous quantity of fuel leakage after impact. It may not be practical or even necessary to provide access covers with properties which are identical to those of the adjacent skin panels since the panels usually vary in thickness from station to station and may, at certain stations, have impact resistance in excess of that needed for any likely impact. The access covers, however, need not be more impact resistant than the average thickness of the adjacent tank structure at the same location, had it been designed without access covers. In the case of resistance to tire debris, this comparison should be shown by tests or analysis supported by test.

b) In the absence of a more rational method, the following may be used for evaluating access covers for impact resistance to tire and engine debris.

i) Tire Debris - Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with the gear in the down and locked position and the oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass distributed over an impact area equal to 1½ percent of the total tread area. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground under normal operation.

ii) Engine Debris - Covers located within 15 degrees forward of the front engine compressor or fan plane measured from the center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from the center of rotation, should be evaluated for impact from small fragments. The evaluation should be made with energies referred to in AC 20-128A, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure. The covers need not be designed to withstand impact from high-energy engine fragments such as engine rotor segments or propeller fragments. In the absence of relevant data, an energy level corresponding to the impact of a 3/8 inch cube steel debris at 700fps, 90 degrees to the impacted surface or area should be used.
(For clarification, engines as used in this advisory material is intended to include engines used for thrust and engines used for auxiliary power, APU.)

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

The following guidance material in regard to fuel access cover fire resistance requirements is the same as the existing AC for the FAR but incorporates the draft text developed by the GSHWG for the JAR.

(The following wording is for the FAR only – same as the existing AC)

5. FIRE RESISTANCE.

a. All fuel tank access covers must be fire resistant. The definition of fire resistant, as given in Part 1 of the FAR, means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used. For the purpose of complying with this requirement, the access cover is assumed to be subjected to fire from outside the fuel tank. The fuel tank access covers need not be more fire resistant than the contiguous tank structure.

b. Access covers, not as fire resistant as contiguous tank structures, should be tested for five minutes using a burner producing a 2000°F flame. The test burner and procedures for instrumentation and calibration should be as defined in AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/6/90. The test cover should be installed in a test fixture representative of the actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

(The following wording is for the JAR only)

4. RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of JAR 25.963(e)(2) if they are fabricated from solid aluminium or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminium alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as the minimum thickness of the surrounding wing structure.

c) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5 minutes. The test cover should be installed in a test fixture representative of actual installation in the aeroplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or distortion that would lead to fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

GSHWG ARAC Fast Track Report - FAR 25.963 (e) Fuel Tank Access Covers

1. What is the underlying safety issue addressed by the FAR/JAR?

Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.
In addition, prolonged exposure to a fire could cause sufficient damage to some fuel tank access covers designs to allow fuel leakage and subsequent ignition.

2. What are the current FAR and JAR standards?

FAR 25.963(e), Amendment 25-69

"(e) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris.
(2) All covers must be fire resistant as defined in part 1 of this chapter."

AC 25.963-1, dated 7/29/92

1. PURPOSE

This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of FAR 25.963(e).

2. RELATED FAR SECTIONS

The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with FAR 25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of FAR 25.963(e).

3. BACKGROUND

Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE

a. All fuel tank access covers must be designed to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimize penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the airplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.

b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.

(1) Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass traveling at airplane rotation speed (V_R), and distributed over an impact area equal to 1 1/2 percent of the total tread area.

(2) For turbine powered airplanes, covers located within 15 degrees forward of the front engine compressor or fan plane measured from center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from center of rotation, should be evaluated for impact from small fragments (shrapnel) with energies referred to in AC 20-128, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure, issued 3/9/88. The covers need not be designed to withstand impact from high energy engine fragments such as engine rotor segments or propeller blade fragments.

5. FIRE RESISTANCE

a. All fuel tank access covers must be fire resistant. The definition of fire resistant, as given in Part 1 of the FAR, means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used. For the purpose of

complying with this requirement, the access cover is assumed to be subjected to fire from outside the fuel tank. The fuel tank access covers need not be more fire resistant than the contiguous tank structure.

b. Access covers, not as fire resistant as contiguous tank structures, should be tested for five minutes using a burner producing a 2000°F. flame. The test burner and procedures for instrumentation and calibration should be as defined in AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/6/90. The test cover should be installed in a test fixture representative of the actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

JAR 25.963(g), Amendment 93-1 to Change 13

"(g) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris.
(2) Reserved
(See ACJ 25.963(g))"

ACJ 25.963(g), Amendment 93-1 to Change 13

"Fuel Tanks: General (Acceptable Means of Compliance)
See JAR 25.963(g)
1. *Purpose.* This ACJ sets forth an acceptable means of showing compliance with the provisions of JAR-25 dealing with the certification requirements for fuel tank access covers. Guidance information is provided for showing compliance with the impact resistance requirements of 25.963(g).
2. *Background.* Fuel tank access covers have failed in service due to impact with high speed objects such as failed tyre tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

3. *Impact Resistance*

a. All fuel tank access covers must be designed to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should however, choose to "minimise penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the aeroplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.
b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.
i. Covers located within 15° inboard and outboard of the tyre plane of rotation, measured from the centre plane of tyre rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tyre tread segments having width and length equal to the full width of the tread, with thickness of the full tread plus casing. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground. Generally, this will be the higher of the aircraft
rotation speed (Vr) and the flapless landing speed.
ii. Covers located within 15° forward of the front compressor or fan plane measured from the centre of rotation to 15° aft of the rearmost turbine plane measured from the centre of rotation, should be evaluated for impact from small fragments (shrapnel). The covers need not be designed to withstand impact from high energy engine fragments such as rotor segments."

Note: FAR 121.316 requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of 25.963(e). This requirement however was considered to be beyond the scope of the tasking to the GSWHG, and has therefore not been discussed. JAR-26 currently does not contain an equivalent retro-active requirement.

3. What are the differences in the standards and what do these differences result in?

FAR 25.963(e)(1) and JAR 25.963(g)(1) are identical.

FAR 25.963(e)(2) requires fuel tank access covers to be fire resistant. There is no such requirement in JAR-25. This results in additional compliance demonstration for FAR 25 compared to JAR-25.

4. What, if any, are the differences in the means of compliance?

The guidance given on tire debris is different in AC 25.963-1 from ACJ 25.963(g), in terms of tire fragment spread angle, tire fragment size and tire fragment speed. When applying the guidelines of ACJ 25.963(g) the result is a much higher impact energy of the tire fragments compared to application of the guidelines of AC 25.963-1, although the tire fragment spread angle defined in ACJ 25.963(g) is smaller than the angle defined in AC 25.963-1.

AC 25.963-1 contains guidance on showing compliance with the fire resistance requirement of FAR 25.963(e)(2). Because JAR 25.963(g)(2) does not require fuel tank access covers to be fire resistant, ACJ 25.963(g) does not contain any guidance on this subject.

5. What is the proposed action?

The proposed action is, for the rule, to harmonize on a revised wording of FAR 25.963(e)(2) / JAR 25.963(g)(2). This proposal removes the words "fire resistant" from the rule, and replaces it by the definition of fire resistant of part 1, allowing that the fuel tank access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material.

For the advisory material, for tire debris, harmonization is achieved by adopting the current AC 25.963-1 guidance on tire fragment spread angle and mass, but adopting the current ACJ 25.963(g) guidance of tire fragment speed.

For the advisory material, for engine debris, harmonization is achieved by adopting an additional definition of engine debris to be used in the absence of relevant data.

For the advisory material, for fire resistance, harmonization is achieved by adopting revised acceptable means of compliance to resistance to fire.

6. What should the harmonized standard be?

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

Docket No. ; Notice No.]

RIN 2120–

[Title] Fuel Tank Access Covers

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to amend the fire resistance requirements of §25.963(e)(2) to provide an equal level of safety for the fuel tank structure and the fuel tank access covers. The current requirement specifies that fuel tank access covers must be fire resistant as defined in part 1. The amendment would include an option permitting fuel tank access covers to have a level of fire resistance equivalent to the surrounding tank structure.

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 that fuel tank access covers must be fire resistant as defined in part 1. That requirement was adopted by amendment 25-69 after an FAA review of adverse service experience prompted by an accident in Manchester, England.

Discussion: Section 25.963(e)(2) states that fuel tank access covers must be fire resistant as defined in part 1. The equivalent JAA requirement does not have any standard for fire resistance. In the interest of harmonization, the GSHWG has recommended that JAR 25 should be revised to include a requirement for fire resistant fuel tank access covers. The definition of the term 'fire resistant' differs between the FAR and JAR. The JAA recently revised the definition in JAR 1 to indicate that fire resistant materials are those which can withstand the ISO.....flame applied for 5 minutes. The FAA definition in part 1, which has been in existence for many years, refers to equivalency to aluminum in the dimensions appropriate for the application. The FAA has no intention to make the existing FAA requirement more stringent, however, the different definitions between JAA and FAA would result in different compliance standards. The working group therefore established new criteria which would provide an acceptable level of safety. Section 25.963(e)(2) would be revised to eliminate the term 'fire resistant as defined in part 1', and to provide several options for showing a minimum level for resistance to fire. Compliance could be shown if one of the following options could be met: (a) The tank access covers are made of aluminum, titanium, or steel, or (b) the tank covers can withstand the test of AC 20-135, or ISO 2685-1992(E) for a period of 5 minutes without failure, or (c) the tank covers can withstand the test of AC 20-135, or ISO 2685-1992(E) for a period of time at least as great as that of the immediately surrounding structure (such as the wing skins for wing fuel tanks).

This revision would permit fuel tank access covers to have the same level of fire resistance as the surrounding tank structure, thereby providing an equal level of safety for the entire fuel tank relative to fire resistance.

After the working group reached agreement on the above criteria, they coordinated with the JAA PPSG. The PPSG could not accept adding the proposed requirement to the JAA rule, since they believe there is no fire resistance requirement for the basic fuel tank structure. Therefore JAA never reached final technical agreement on this proposal. FAA is taking this action unilaterally, without concurrence by the JAA.

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.[]

2. Amend §25.963(e)(2) to read as follows:

"(2) All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminum alloy in dimensions appropriate for the purpose for which they are to be used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material."

Issued in Washington, DC, on

7. How does the proposed standard address the underlying safety issue (identified under #1)?

The proposed rule and advisory material both address impact on fuel tank access covers by tire fragments, engine debris, or other likely debris, and also addresses the resistance to fire of fuel tank access covers.

8. Relative to the current FAR, does the proposed standard increase, decrease or maintain the same level of safety? Explain.

For impact on fuel tank access covers by tire fragments, engine debris, or other likely debris, the proposed rule and advisory material will maintain the tire fragment mass but increases the spread angle and fragment speed to be considered, compared to the current FAR standard. These adjustment were made based on a rational review of in-service data. The net result is to increase the energy level specified for current FAR standards. These energy levels have been reviewed by the authorities and found to be acceptable as to level of safety.

9. Relative to current industry practice, does the proposed standard increase, decrease or maintain the level of safety? Explain.

Most recent new certification programs have been certified using an envelope case involving both FAR/JAR standards for impact resistance. Compared to these envelope standards the level of energy associated with tire fragments would decrease upon adoption of the new proposed standards. This reduction in energy level is considered acceptable since it is based on the use of rational analysis of in-service data.

For resistance to fire, the proposals will maintain the level of safety intended by the current FAR standard. Compared to the current JAR standard, the level of safety will be increased.

10. What other options have been considered and why were they not selected?

Adoption of the current guidance contained in ACJ 25.963(g) on tire fragments size has been considered, but could not be supported by in service data.

Rejection of the requirement for fuel tank access covers to be fire resistant has also been considered, because the basic wing structure is not required to be fire resistant either. For the sake of harmonization the JAA has accepted the proposed wording.

11. Who would be affected by the proposed change?

Airplane manufacturers.

12. To ensure harmonization, what current advisory material (e.g. ACJ, AMJ, AC, policy letters) need to be included in the rule text or preamble?

The current AC 25.963-1 allows that the fuel tank access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material. This has been transferred to the proposed rule.

13. Is existing FAA advisory material adequate? If no, what advisory material should be adopted?

The existing FAA advisory material is adequate to address the underlying safety concerns, but harmonization can only be achieved by adoption of the proposals described below.

The following revised guidance material is recommended:

Draft
Fuel Tank Access Doors
AC 25.963-1
May 19, 1999

1. PURPOSE. This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of 25.963(e).

2. RELATED FAR SECTIONS. The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with 25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of 25.963(e).

3. BACKGROUND. Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a fuel tank may result in loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE.

a) All fuel tanks access covers must be designed to minimise penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimise penetration and deformation" by analysis or test of covers using debris of a type, size, trajectory and velocity that represents conditions anticipated in actual service for airplane model involved. There should be no hazardous quantity of fuel leakage after impact. It may not be practical or even necessary to provide access covers with properties which are identical to those of the adjacent skin panels since the panels usually vary in thickness from station to station and may, at certain stations, have impact resistance in excess of that needed for any likely impact. The access covers, however, need not be more impact resistant than the average thickness of the adjacent tank structure at the same location, had it been designed without access covers. In the case of resistance to tire debris, this comparison should be shown by tests or analysis supported by test.

b) In the absence of a more rational method, the following may be used for evaluating access covers for impact resistance to tire and engine debris.

i) Tire Debris - Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with the gear in the down and locked position and the oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass distributed over an impact area equal to 1½ percent of the total tread area. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground under normal operation.

ii) Engine Debris - Covers located within 15 degrees forward of the front engine compressor or fan plane measured from the center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from the center of rotation, should be evaluated for impact from small fragments. The evaluation should be made with energies referred to in AC 20-128A, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure. The covers need not be designed to withstand impact from high energy engine fragments such as engine rotor segments or propeller fragments. In the absence of relevant data, an energy level corresponding to the impact of a 3/8 inch cube steel debris at 700fps, 90 degrees to the impacted surface or area should be used.
(For clarification, engines as used in this advisory material is intended to include engines used for thrust and engines used for auxiliary power, APU.)

5. RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of 25.963(e)(2) if they are fabricated from solid aluminium or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminium alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a

period of time at least as great as the minimum thickness of the surrounding wing structure.

c) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5 minutes. The test cover should be installed in a test fixture representative of actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or distortion that would lead to fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

14. How does the proposed standard compare to the current ICAO standard?

The current ICAO standards do not address this issue.

15. Does the proposed standard effect other HWG's?

Yes, the PPIHWG, on the issue of resistance to fire. The PPIHWG has reviewed and accepted the GSHWG proposal.

16. What is the cost impact of complying with the proposed standard?

Comparing the proposal with the current FAR rule and advisory material, no increase or decrease in cost is expected.

17. Does the HWG want to review the draft NPRM at "Phase 4" prior to publication in the Federal Register?

Yes.

18. In light of information provided in this report, does the HWG consider that the "Fats Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the "Fast Track" process. Explain.

The GSHWG considers the Fast Track process to be appropriate for this project.

* * *

Recommendation Letter

Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Pratt & Whitney
A United Technologies Company

September 19, 2003

Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Attention: Mr. Nicholas Sabatini, Associate Administrator for Regulation and Certification

Subject: ARAC Recommendations, General Structures – (Operational Tests and Fuel Tank Access Covers)

Reference: ARAC Tasking, Federal Register, dated September 18, 1998 and November 26, 1999

Dear Nick,

The Transport Airplane and Engine Issues Group is pleased to submit the following as a recommendation to the FAA in accordance with the reference tasking. This information has been prepared by the General Structures Harmonization Working Group.

- General Structures HWG Report – 25.683, Operation Tests
- General Structures HWG Report – 25.963, Fuel Tank Access Covers

The FAA is asked to note that the recommendation on impact resistance of fuel tank access covers reflects a WG consensus. Consensus could not be attained on the fire resistance aspect and the dissenting opinions are documented for FAA consideration.

Sincerely yours,

Craig R. Bolt

C. R. Bolt
Assistant Chair, TAEIG

Copy: Dionne Krebs – FAA-NWR
Mike Kaszycki – FAA-NWR
Effie Upshaw – FAA-Washington, D.C.
Andy Kasowski - Cessna

Recommendation

March 10, 2003
L350-75-03-31

Mr. Craig R. Bolt
Assistant Chair, TAEIG
Pratt & Whitney
400 Main Street
East Hartford, Ct 06108

Dear Craig:

Subject: Submittal of Results of Harmonization Effort on FAR/JAR §25.963(e), Fuel Tank Access Covers

This submittal is a follow-up to an earlier submittal in June of 1999 on the same subject. The General Structures Harmonization Working Group, having reached technical agreement on the impact resistance requirements for fuel tank access covers, but not on the fire resistance requirements, is submitting harmonized rule and advisory material for impact requirements on fuel tank access covers. Although rule and advisory material initially acceptable to group members was drafted within the GSHWG, forces outside the group have conspired to block full harmonization of this work.

Status Summary

The GHWG proceeded in good faith to harmonize the material and did reach agreement within the GHWG on changes to the rule and the advisory material, including the provisions related to fire resistance. Upon initial review of the draft harmonized material on fuel tank access panel fire resistance, JAA Power Plant Study Group (JAR-PPSG) voiced objections, noting that the relationship between the requirement for fuel tank access covers and the surrounding surface is inconsistent since there is no similar general rule for the surrounding surface. After further discussions, a compromise position was identified and rule and advisory material drafted to reflect the compromise. The JAA have proposed to adopt this draft material for fuel tank access cover fire resistance, reference NPA 25E-304. Subsequently, the FAA objected to the draft harmonized text, stating that the proposed text would be a reduction in the level of safety currently required by the FAR. In their objection, the FAA cite the intent of the existing FAA rule is to ensure the fuel access covers would remain intact in a ground fire condition with the assumed wing construction being aluminum. Further, the FAA believe that current rules should be updated to include a minimum fire resistance standard for the fuel tank as well as the current standard for the fuel access covers, but realize this is outside the charter of this harmonization task and would therefore require re-tasking by ARAC. Based on the positions of the PPSG and the FAA, the GSHWG does not believe any further progress on this subject can be made within the group. There must be intervention or acceptance of a non-harmonized rule in regard to fuel tank access cover fire resistance. To this end, the group has agreed that the harmonized rule and advisory material developed for fuel tank access cover impact resistance should be submitted for adoption and recommend that the fire resistance

requirements for fuel tank access covers remain un-harmonized and referred back to the TAEIG for disposition and/or re-assignment. Attachments A and B to this letter provide additional information in regard to the FAA and PPWG positions on this topic.

The materials being submitted are the harmonized rule and advisory material addressing the impact resistance requirements for fuel tank access covers. The GSHWG recommends that the fire resistant requirements for fuel tank access panels remain un-harmonized and that a re-tasking be initiated for not only fuel tank access covers but also fuel tanks in general in regard to fire resistance to a HWG more suited to address this topic (possibly the PPIHWG). The GSHWG remains available and willing to review any structural issues related to the development of harmonized requirements for fuel tank fire resistance.

Sincerely,

Andrew H. Kasowski
General Structures HWG Chairperson
316-517-6008
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Attachment A

Supplemental Data – Fuel Tank Access Cover Fire Resistance

FAA Background Data

Excerpts from
FAA Comments to JAA NPA 25E-304
Fuel Tank Structural Integrity / Fuel Tank Access Covers

Fuel Tank Access Covers

The ARAC recommendation is to incorporate wording directly into the rule (FAR/JAR 25.963(d)) that would allow the fuel tank access panels to be "equivalent to the adjacent / surrounding skin," rather than meet the fire resistant standard stated in the current FAR. This proposal is a step backward in fuel tank safety, particularly in the post crash fire environment.

The current transport fleet post crash safety record is based upon use of aluminum structures. These structures conduct heat well and are "fire resistant" as defined in FAR 1.1. The fire resistance requirement in FAR 25.963 was introduced because of the use of nylon fuel tank access panels by one manufacturer. These panels suffered severe damage when exposed to underwing fires. The doors were replaced with cast aluminum doors to provide appropriate fire resistance. The impact resistance of fuel tank panels made of cast aluminum, however, was found to cause a safety concern. Therefore, the cast aluminum doors were replaced by doors with improved impact resistance in areas of the wing exposed to tire and uncontained engine debris. FAR 25.963 was amended to require both fire resistance and impact resistance for fuel tank access panels. While this rulemaking addressed the adverse service experience of conventional transport airplanes with fuel tank structures that were made of impact and fire resistant aluminum, the FAA did not foresee the future use of composite structures nor possible development of non-conventional delta wing designs that may significantly reduce the inherent safety of conventional fuel tank designs. Looking back, FAR 25.963 should have established an objective standard for fuel tanks integrity for impact and fire resistance.

The Concorde and other accidents have highlighted the safety implications of damage to fuel tanks from debris or fire. The delta wing design of the Concorde allows the use of lower wing skins made of 1.2 mm titanium. While this material offers excellent fire resistance, the impact resistance was found to be inadequate. The British Midlands 737 event also underscores the need to provide impact resistance for fuel tanks.

In addition, the evolution of airplane structures has resulted in the use of new materials for fuel tank structures. One aspect of these new materials is a possible lessening of their resistance to fire, (e.g. composite horizontal stabilizer fuel tanks).

Based upon the use of new materials and the need to assure fuel tank integrity from both fire and impact damage, the FAA position is that the current FAR 25.963 requirement for the fuel tank access panels to be impact and fire resistant should be applied to the entire

external surfaces of the fuel tank. The harmonized rule should not reduce the current level of safety and allow use of doors made of materials that do not meet fire resistance standards, as defined in FAR/JAR Part 1. The FAA intends to apply special conditions to future airplane designs requiring that both impact resistance and fire resistance are addressed on fuel tanks located in the wing and stabilizer, etc. so that the level of safety achieved by the current transport fleet is not inadvertently reduced by introduction of newer technology materials, or the evolution of airplane designs such as the "Sonic Cruiser".

From: Mike.Dostert@faa.gov
To: frederick.a.lewis-smith@boeing.com; olivier.grimaud@airbus.aeromatra.com; OTTRIA_Edmond@sfact.dgac.fr; patrick.zaccaria@airbus.aeromatra.com
cc: alan.o.macias@boeing.com; anne.jany@airbus.fr; braulio.medeiros@embraer.com.br; brian.handley@rolls-royce.com; carlos.vieira@embraer.com.br; clifford.m.schjoneman@boeing.com; geoffrey.armstrong@notes.canadair.ca; gruz_laurent@sfact.dgac.fr; hamerm@tc.gc.ca; hans-dieter.hansen@airbus.dasa.de; jean-claude.nanche@airbus.fr; ji.paik@embraer.com.br; joe.sikora@boeing.com; johann.hervault@airbus.aeromatra.com; john.l.doherty@boeing.com; kenneth.b.dunkelberg@boeing.com; krijn.pellen@rolls-royce.com; lonnie.richards@bae.co.uk; mbowser@dehavilland.ca; pierre-emmanuel.arnaud@airbus.aeromatra.com; robert.mather@pwc.ca; robin.boning@srg.caa.co.uk; sarah.knife@ae.ge.com; stadmef@pweh.com; stuart.browning@hs.utc.com; virtuej@pweh.com; wmiles@cessna.textron.com; youngml@pweh.com; George.Soteropoulos@faa.gov; Mike.McRae@faa.gov; Rich.Yarges@faa.gov; Lanny.Pinkstaff@faa.gov; Neil.Schalekamp@faa.gov;

Subject: Re:FW: Fuel Tank Access Covers

Andy,

In 1998 and 1999 there was much correspondence from Phil Sallee, Robin Boning and myself regarding this issue. I have scanned copies of the info, attached. The bottom line: the FAA position was that the current fire resistance requirement was in deed a requirement in the FAA rule and that we would not agree to lessen the requirement. In fact we wanted to apply the same standard to the rest of the wing (you can read the 1999 e-mail for more details) but felt it was outside the harmonization effort. Phil suggested the structures group had two options. Enveloping the JAA and FAA requirements, or writing a report with an FAA minority position and sending it to the TAEIG (I don't know if the group chose to take Phil's advice to document the FAA "minority" opinion, I have not seen it if they did.) Enveloping would include adopting the FAA requirement for fire resistance, using the structures FAR 1 definition of equivalence to aluminum (not the propulsion standard of 5 minutes at 2000 degrees, requiring extensive testing as Robin seems to imply in his message). The intent of the FAA rule was to ensure the doors would remain intact in a ground fire condition. The assumed wing construction at the time the rule was developed was aluminum. New materials are being used for fuel tanks (composite stab tanks) so the rule should be updated to include a minimum fire resistance standard for the wing as well as the current requirement for the doors. The Concorde accident only highlights the need to consider fire resistance and impact resistance for the other portions of the wing, not just the access panels. Applying the standard to the remainder of the wing or fuel carrying portions of the airplane that would be exposed to a ground fire condition would require re-tasking the ARAC group, but this

is what should be done. The FAA may address this issue via an issue paper on certification projects if it is considered an unsafe condition.

The ARAC structures group version of the rule has been routed within the FAA and is not acceptable. At this time we do not plan on publishing the proposed ARAC version of the rule so I would suggest the NPA not be released.

The FAA propulsion position has remained unchanged since 1999. We do not intend to lessen the level of safety by eliminating our requirement for fire resistance of fuel tank access panels.

Regards, Mike Dostert

From: Mike Dostert [Mike.Dostert@faa.gov]

Sent: Friday, January 04, 2002 9:05 AM

To: Wim.Doeland@RLD.minvenw.nl; robin.boning@srg.caa.co.uk

Cc: ken.fontaine@srg.caa.co.uk; peter.hayward@srg.caa.co.uk; frederick.a.lewis-smith@boeing.com; olivier.grimaud@airbus.aeromatra.com; Rich.Yarges@faa.gov; rory.martin@srg.caa.co.uk; Kasowski, Andy; anne.jany@airbus.fr; bert.hischemoeller@brr.de; clifford.m.schjoneman@boeing.com; f.sepe.rai-enac@interbusiness.it; georg.krook@faidor.de; hans-dieter.hansen@airbus.dasa.de; jean-claude.nanche@airbus.fr; gruz_laurent@sfact.dgac.fr; lgruz@aol.com; manfred.fiedler@lba.de; mike.bayley@baesystems.com; Serge.BRUN@dassault-aviation.fr; staffan.jonsson@fltsafety.lfv.se; wim.overmars@fokkerservices.storkgroup.com; Mike.McRae@faa.gov; Neil.Schalekamp@faa.gov; Rich.Yarges@faa.gov

Subject: Re:FUEL TANK ACCESS COVERS

Robin,

You are likely tired of hearing from me on this issue, but in reading your message I feel the FAA position in not understood. The following is offered to help clarify our position.

I do not view the FAA position as raising the safety bar or imposing new requirements. My earlier correspondence on this issue discussed several events where large under wing ground fires occurred. In one case a large fire occurred on an airplane that incorporated "new technology" nylon access panels that had been introduced into the 747 fleet as a product improvement for weight savings (circa 1970s). The doors nearly melted out which would have release large quantities of fuel. The FAA initiated AD action to eliminate nylon fuel tank access panels from the 747 fleet. The requirement for fire resistance was subsequently incorporated into the FARs. I do not believe additional justification for the FAA requirement for the access panels to be fire resistant is needed. (I have attached a copy of a picture from the New Delhi event for your view)

I do not recall any agreement between the FAA and JAA propulsion community regarding allowing the fire resistance of access panels to be equivalent to the surrounding structure. Phil Salles' message to the structures group indicates the PPIHWG recognition of the FAA "minority position". I think a note of clarification regarding the FAA AC is also needed. The AC does state that the doors need not be more fire resistant than the surrounding tank structure. This statement was based upon the assumption of aluminum wing construction therefore the thought was that all doors would be meet the part 1 fire resistance requirement. Use of composite tank walls was not envisioned. It should be

noted that you cannot do rulemaking by AC therefore, this statement cannot be used to allow use of materials that would not meet the minimum fire resistance requirement in the rule itself.

With regard to my position that other fuel tank surfaces need to be addressed in future ARAC tasking (new rulemaking): Looking back we see good experience from wings constructed of aluminum. (This is why you do not see any recommendation from accident investigators in the two events you noted in your message.) The FAA access panel fire resistance requirement is based upon the FAR part 1 definition, requiring only that the panels be equivalent to aluminum. Not the traditional 2000 degree 5 minute burner test used by the propulsion community.

It is not my intention to require all fuel tanks exposed to ground fire meet a 2000-degree fire for 5 minutes. It is my intention to insure that access panels have fire resistance equivalent to aluminum so that the current level of safety is maintained.

Based upon the introduction of new technology materials in fuel tank construction, we need to look forward and be cognizant of possible adverse impacts on safety. As you know the public has accused the FAA of looking back to make safety improvements, sometimes referred to as "tombstone mentality." Waiting for adverse service experience and recommendations for change from accident investigators is not the way we should be doing our job as an industry.

Manufacturers have started to use composites for tank walls located outside the fuselage where post crash ground fire is a serious safety concern. The intention of the FAA position is that the new tanks provide an equivalent level of protection from post crash ground fire and underwing fires as the current fleet of aluminum tanks.

While the Concorde accident was not caused by fire damage, it was caused by damage to the fuel tanks that were made of 1.2 mil thick titanium. The wing construction on the Concorde is unique relative to typical commercial transports. The Sonic cruiser (if ever built) will likely have a delta wing with similar construction. Both impact resistance and fire resistance are considerations for new technology airplane designs where use of new materials and configuration differences may cause reduced fuel tank safety. Our goal, as a minimum, should be to maintain the current level of fuel tank integrity.

Regards, Mike Dostert

Subject: Fuel Tank Access Panel Fire Resistance
Author: Mike Dostert at ANM100
Date: 5/21/1999 2:03 PM

Robin, Our Airframe engineers are working toward harmonization of the standards for fuel tank access panels. I was given a copy of your FAX dated May 5, 19999 to Phil Sallee. I would like to clarify the FAA position regarding this regulation.

Background:

These standards came about due to in-service problems (incidents/accidents) where fuel tank panels constructed of nylon were severely damaged by fire. Early in the 747 program a weight savings was implemented that changed all doors from cast aluminum to nylon. Several events resulted in underwing fires and damage to the doors. On December 18, 1970 Boeing Service bulletin 747-57-2035 was issued. The reason stated in the bulletin was "Fuel tank access holes on the wing lower surface have molded plastic access doors. In one instance following an engine fire, two of the access doors adjacent to the engine showed evidence of heat damage but no fuel leakage. However, it has been determined that prolonged exposure to a fire could cause sufficient damage to the plastic doors to allow fuel leakage." Doors near the engines were changed to aluminum type. While I was working for Boeing I personally viewed pictures of the lower wing skin following the fire noted in the bulletin. I would conclude as the bulletin writer did that the nylon panels were close to failure. Amendment 25-23, 1970, introduced the requirement in 25.867 that "(a) surfaces to the rear of the nacelles, within one nacelle diameter of the nacelle centerline, must be at least fire resistant."

In 1979 the FAA issued AD 79-20-11 that mandated incorporation of the service bulletin noted above and also replacement of the remaining nylon doors. This AD resulted from the Iranian Tanker 747 accident investigation which showed that the nylon doors provided and opening for the creation of arcs during a lightning strike. Service bulletin 747-28-2084 stated "Installation of aluminum fuel cell access doors precludes induced voltages due to lightning strike to the airplane." Results of testing conducted by Boeing showed that arcing to the wing skin from surge tank drain lines that were routed near the door opening could occur.

I would also like to bring your attention to two non-fatal accidents that would likely have been much more serious if fuel tank access panel failure occurred. In 1970 a 747 landing in New Delhi experienced engine mount failure that allowed a fuel leak and large underwing fire. Another case occurred in March of 1994 when a 747 landing in Tokyo experienced a similar problem. In both cases large underwing fires occurred resulting in major damage to the wing. Nylon doors would likely have failed and allowed all fuel in the tank to be added to the fire or allowed a tank explosion. (The Tokyo event caused a

fire that was intense enough to ignite the tank. It listed in the ARAC report on fuel tank explosions, the tank ignited internally but did not cause overpressure)

Discussion:

While the current FAA standard was written to address typical wing construction using aluminum, the safety concern and need for a fire resistance standard has not changed by the introduction of wing surfaces that may not be fire resistant. From what I have been told, changes to the standard of fire resistant have been proposed by the FAA rep, which included fire resistant or fire resistance equivalent to the adjacent wing/fuel carrying tank surfaces.

This would seem to be a realistic standard that accounts for fuel tanks constructed of less fire resistant materials. Although the current rule may not be perfect, the need to retain fuel in the fuel tanks and limit the size of a fire is clear. A small fire with limited fuel may be of little consequence, whereas a small fire that has additional fuel from the fuel tank added would likely be hazardous.

One might argue that all tank surfaces should be fire resistant to address post crash ground fire and underwing fire concerns. However, we are harmonizing, not trying to mandate new standards. I believe the FAA proposal provides a practical regulation that can and has been met, and allows harmonization. The FAA does not intend to withdraw our fire resistance standard, and in the spirit of enveloping the more stringent would be adopted.

I hope the above background and discussion helps to understand why we have a standard and why we would not be receptive to withdrawing of the current requirement.

Regards, Mike Dostert

Attachment B

Supplemental Data – Fuel Tank Access Cover Fire Resistance

PPSG Background Data

From: Doeland, Wim (DL)(IVW) [Wim.Doeland@ivw.nl]

Sent: Tuesday, February 18, 2003 7:11 AM

To: Kasowski, Andy; Blacklay, Edward (Ted); Collins, Richard; Comino, Georgio; Doeland, Wim (DL)(IVW); Eastin, Robert; Hoggard-Jr., Amos; LaFosse, Bertrand; Martin, Rory; Newman, Philip; Pereira, Humberto; Pinsard, Laurent; Reid, Mike; Schmidt-Brandecker, Bianka; Smith, Johnny; Yarges, Rich

Subject: RE: GSHWG AI 33-6 & 33-7

Andy,

The JAA has decided to go ahead with the full NPA 304, so including resistance to fire (and impact resistance) for the access covers. Since we have no requirement or guidance on resistance to fire for access covers today in JAR-25 it was felt that including unharmonised material in JAR-25 was the preferred option instead of having nothing at all and wait for future harmonisation on this subject.

This decision was discussed by SStG, PPStG and JAA/HQ and all agreed. Of course, the GSHWG could still recommend differently (i.e. not to adopt fire resistance). But maybe you want to point out in your letter to TAEIG that the above decision was taken, just to get the full picture.

Regards,

Wim

Subject: FUEL TANK ACCESS COVERS
Author: robin.boning@srg.caa.co.uk
Date: 1/3/2002 10:59 AM

Wim,

This seems to be an issue where technical differences exist between JAA (PPSG) and the Powerplant community in the FAA. I had thought that we had reached a compromise, based upon the current FAA rule and AC, which collectively do not require the access covers to be more resistant to fire than the basic wing structure. However, it appears that this is no longer acceptable to Mike Dostert.

Re:FW: Fuel Tank Access Covers

I do not propose to reiterate all the arguments again, but my main point might be that, Mike's informal E-mail messages apart, I have not seen any formal recommendation for access covers/all wing structure to be Fire Resistant.
- The original NPRM (88-10) for fuel tank access panels (covers) offered no justification as to why the covers should be Fire Resistant.
- Following the 'Manchester' accident, the Accident Investigators recommended the adoption of impact resistant standards for fuel tank access covers; no comment or recommendation was made for these covers to be Fire Resistant.
- The introduction of the 25.867 requirement for 'surfaces behind engines' to be resistant to fire did not consider that other parts of the wing were at risk i.e. no resistance to fire standard was required for access panels or for other surfaces.
- Although the tragic Concorde accident resulted from 'lack of impact resistance', there: (i) has been no Accident Investigator recommendation (so far) for 'fire resistance', (ii) the modification to the fuel tanks was not required, nor met any defined level of resistance to fire. I am not in favour of citing this accident as reason, or justification for additional requirements to aircraft which have totally different types of construction.
- Mike mentions two accidents - 747/New Delhi and 747/Tokyo - but I have not seen any recommendations from Accident Investigators.

Having said that, I can confirm that the PPSG still support the philosophy of P-NPA 25E-304 - "The P-NPA involves two subjects which have been of particular long term interest to PPSG members: (i) fuel tank integrity, close to the fuselage and engines and (ii) fire resistance of fuel tank covers. The P-NPA addresses both of these issues in a manner acceptable to the PPSG."

We will be prepared to discuss further if this Harmonised proposal is not acceptable to the FAA, but I am sure that our main concern will remain – not to introduce new requirements, which have not been adequately justified.

Best Wishes for the New Year.

Robin

From: Boning Robin

Sent: 07 September 1999 17:24

To: 'THADDEE'
Cc: Fontaine Ken; 'boltcr@pweh.com'; Blacklay Ted; James Stephen; 'ANNE'; 'BERT'; 'CLAUDE'; 'ERIC'; 'FRANK'; 'GEORG'; 'HANS-DIETER'; 'LAURENT'; 'MANFRED'; 'MIKE'; 'OLIVIER'; 'STAFFAN'; 'WIM'; 'Sallee, George P'; 'TCHAVDAROV'

Subject: FAR/JAR 25.963 HARMONISATION

To: T Sulocki, JAA
c.c. J-C Tchavdrov, Airbus; G P Sallee, Boeing; C R Bolt; E H Blacklay, CAA; J K Fontaine, CAA; S L James, CAA; PPSG Members

Reference: PPSG 99/12/RWB
7 September 1999

FAR/JAR 25.963 HARMONISATION

1. We have been discussing this subject for some considerable time now and the PPSG position has been well documented. Our E-mail message (PPSG 99/04/RWB), dated 17 May 1999 gave the reasons why we were not in favour of adopting a 'Fire Resistant' standard for fuel tank access covers.
2. However, we have now entered the final phase of Harmonisation activity as evidenced by the 'Better Plan' proposals, agreed during the FAA/JAA Conference in June 1999 and every effort needs to be made to finalise this activity.
3. The PPSG has been advised of proposals for changes to the FAR 25.963(e)(2), which would make it clear in the Requirement that: " ... the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material". This would overcome one of the PPSG objections, which was that it is not acceptable for the Advisory Material to lessen the intent of the requirement (Reference: Current FAR 25.963(e)(2) and AC 25.963-1).
4. The PPSG members have been informed about this proposal together with the suggestion that we adopt it for JAR-25 as well. To date, I have received no objections and have received a number of messages of support.
5. This message therefore confirms that the PPSG agree in principle that this proposal should be acceptable for adoption into JAR-25, without prejudice to its earlier views. We would, of course, wish to review and be able to comment on, the whole rule/AC proposal package. Please keep us informed.

Regards
R W BONING
JAA PPSG Chairman

From: Boning Robin

Sent: 17 May 1999 11:30

To: 'Sallee, George P'; 'TCHAVDAROV'
Cc: Fontaine Ken; Lancaster, Herbert L; 'tsulocki/jaahq/nl@jaa.nl'; 'boltcr@pweh.com'; Blacklay Ted; James Stephen; ANNE; BERT; CLAUDE; ERIC; FRANK; GEORG; HANS-DIETER; LAURENT; MANFRED; MIKE; OLIVIER; STAFFAN; WIM

Subject: RE: 25.963 HARMONISATION

To: G P Sallee, Boeing

c.c. J-C Tchavdrov, Airbus; T Sulocki, JAA; C R Bolt; H L Lancaster; E H Blacklay, CAA; J K Fontaine, CAA; S L James, CAA; PPSG Members

Reference: PPSG 99/04/RWB
17 May 1999

FAR/JAR 25.963 HARMONISATION

1. Thank you for the letter, dated 4 May 1999, continuing with the subject of Fuel Tank Access Covers and the question of compliance with FAR 25.963(e)(2).
2. You raise an interesting issue with regard to 25.867(a), where, within one nacelle diameter, there is a requirement for surfaces to the rear of the nacelles to have a resistance to fire capability. This is another disharmony, where JAA has substituted the phrase: " ... constructed of materials at least equivalent in resistance to fire as aluminum alloy in dimensions ...", in place of the FAA version which says " ...must be at least fire-resistant".
NOTE: In NPA 25D-181, JAA deleted all reference to the term 'Fire Resistance' from all requirements, which did not relate directly to the Designated Fire Zones or the boundaries to these zones.
3. This is a difference, which is easy to miss, since JAR-25 does not show the normal underlining for FAR / JAR differences. Thaddee to note for Change 15!
4. FAR/JAR 25.867(a) can clearly apply to wing surfaces, including fuel tank access covers, where there are wing mounted engines. Within the one nacelle diameter, FAR/JAR 25.867(a) requires all surfaces to meet the 'resistance to fire' standard, but this 'resistance to fire standard' is not applied to the whole wing surface, only that part, which is behind the powerplant. Therefore the clear implication is that, there is a conscious agreement not to require this standard to apply to the whole wing.
5. Unless there is proper discussion and agreement that there is a need to introduce a resistance to fire standard for the wing as a whole, JAA will continue to resist the introduction of such a requirement for fuel tank access covers alone. When the PPSG was consulted on the options given in your letter, there was one industry reply saying that Option 3 in your letter ('covers to resist fires as well as adjacent structure') could be lived with, but I can only conclude that this is a decision taken in the spirit of Harmonisation!
6. For PPSG as a whole, the position has been, for many years, that this requirement is not necessary. Therefore Option 1 ('delete FAR 25.963(e)(2)) is the appropriate one for us, with Option 6 ('majority and minority positions to be presented') as a fallback position. I find it hard

to accept the idea of Option 3 ('enveloping'), where the more severe requirement is both technically and administratively flawed. The PPSG position in support of Option 1 is summarised below.

The Harmonised §25.963 should not include any requirement for Fire Resistant fuel tank access covers for the following reasons:

- No clear justification has been seen for the fuel tank access covers to be Fire Resistant. In the air, §25.867(a) provides the necessary resistance to fire from the (most probable) powerplant fire threat; for the ground crash-worthiness case, any exposure of the wing and the covers to fire, almost certainly means that the tank has released fuel already. Any benefit for Fire Resistance is not easy to see.
- Although the 'Manchester' accident report recommended adoption of impact resistance standards for fuel tank access covers, there was no recommendation for Fire Resistance of these covers.
- The principle of AC 25.963-1, in allowing the covers to only be as resistant as the rest of the wing, is administratively flawed and exposes the position that there is no general need for wing surface Fire Resistance.
- §25.867(a) also confirms that there is no requirement for wings to be Fire Resistant.
- If 'Fire Resistance' was implemented in any meaningful way, the burden for the industry could be huge.
- If however, we impose the requirement and then do not apply it, we belittle our efforts and make it harder to apply the requirements in which we do believe.
- If the FAA cannot justify compliance with the existing rule (and their AC 25.963-1 shows that they cannot), they should consider how a rule can be deleted without giving the appearance of reducing safety.

I hope that the above points can be used constructively to come to a conclusion on this subject.

Regards

R W BONING
JAA PPSG Chairman

4 May 1998

To: R.W. Boning Chairman -PPSG

CC: T. Sulocki, C. Bolt, H. Lancaster

Reference: Your Letter of 23 April 1999

Subject: FAR/JAR 25.963(e) Harmonization - Fuel Tank Access Covers Fire Resistance

Dear Robin;

I have reviewed your letter, referenced above, providing the Power Plant Study Group (PPSG) position on the FAR 25.963(e)(2) requirement that fuel tank access covers be fire resistant.

* I agree with PPSG, there is nothing in the FAR or JAR that requires fuel tanks to be fire resistant.
* I agree that the requirements of the FAR 25.963(e)(2) should not be increased or decreased by the associated AC (which the AC does).
* My understanding of regulatory history is that the FAR fire resistant fuel tank access cover requirement did result from the Manchester event because plastic fuel tank access covers were being used and had melted. I tend to agree that this melting was probably not a significant contributing factor to the actual outcome
* I agree that the safety benefit associated with fire resistance fuel tank covers has not been reported, at least to my knowledge, and I suspect that the FAA sees no need to justify their position or the rule.
* However, the requirements of FAR 25.867(a) would seem to require fire resistant fuel tanks and access covers within one nacelle diameter area for close wing mounted engines.
* Lastly, it is my perception that given aluminum wing structures, fuel tank access covers made of aluminum (with impact resistance similar to the adjacent wing structure) and the FAR -1 definition for "fire resistant", the "fire resistant fuel tank access cover" requirement has not produced a significant burden.

The task, which I have been asked to help mediate, is to harmonize the 25.963(e) requirements. At the current stage, with the significant disagreement over the fuel tank access cover fire resistant requirement, a consensus position is impossible. I see six options:

1. Accept the 25.963(e) rule without subparagraph (2), which is unacceptable to the FAA. (The FAA considers this approach to have the appearance of reducing safety.)
2. Accept 25.963(e)(2) as written, which is unacceptable to JAA/PPSG positions.
3. Revise the text of the 25.963(e)(2) rule to read, "All covers must resist the effects of fires at least as well as the adjacent structure" and also delete the associated AC text.
4. Do nothing and let TAEIG management resolve the issue by "enveloping" (the FAA rule would likely survive as the "most severe".).
5. Harmonize - start by a request to the FAA to substantiate the safety benefit. However, I doubt that FAA has data to substantiate a safety benefit or will agree to remove the requirement by the lack thereof.
6. Prepare a "Report" that includes the majority and minority positions and leaves the regulatory decision to Authority Management.

I recommend that PPSG consider the options. Lacking a near term agreement (by end of May), I suspect that choice (4) could be invoked by TAEIG. I personally favor option (3) but I would

also remind TAEIG that: a) no safety benefit has been identified for the fuel tank access cover fire resistant requirement and b) that composite wing structures are under development and that the safety impact of composite fuel tank structures needs to be examined and appropriate fire resistance requirements defined.
I sense that AIA, AECMA and JAA can agree and that the FAA disagreement is based on taking a "policy" position. If option (3) is unacceptable to PPSG and JAA, I recommend option (6), which I interpret to be, write a short report that states in summary that three parties out of four (the majority) agree that the fire resistant fuel tank access cover requirement is not justified by a known safety benefit analysis and that the majority view is to recommend deletion of 25.963(e)(2) requirement. The FAA minority position should be attached as an appendix and the points dispositioned by the majority and the report submitted to TAEIG by end of June 1999. I see no value to be obtained from debating the issues longer.

Regards;

G. P. Sallee
Co-Chair PPIHWG

Attachment C

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

Transport Airplane Directorate
WG Report Format
Harmonization and New Projects

1 - BACKGROUND:

- *This section "tells the story."*
- *It should include all the information necessary to provide context for the planned action. Only include information that is helpful in understanding the proposal -- no extraneous information (e.g., no "day-by-day" description of Working Group's activities).*
- *It should provide an answer for all of the following questions:*

a. SAFETY ISSUE ADDRESSED/STATEMENT OF THE PROBLEM

(1) What prompted this rulemaking activity (e.g., accident, accident investigation, NTSB recommendation, new technology, service history, etc.)? What focused our attention on the issue?

Fuel tank access covers have failed in service due to impact with high-speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel that could subsequently ignite. In addition, prolonged exposure to a fire could cause sufficient damage to some fuel tank access cover designs to allow fuel leakage and subsequent ignition. As a result the FAA adopted a change to FAR §25.963 through Amendment 25-69 (reference Federal Register Vol. 54, No. 188, 29 September 1989) to require impact and fire resistant fuel tank access covers on all transport category aircraft. FAA advisory material for fuel access panel impact and fire resistance was adopted in 1992 in the form of AC 25.963-1 (reference Federal Register Vol. 56 No. 115, 14 June 1991). The JAA adopted fuel access panel impact requirements and advisory material through NPA 25C-249, incorporated into the JAR at Change 14. Due to concerns expressed by the PPSG in response to the original NPA 25C-249 which included fire resistance requirements for fuel access covers, no fire resistance requirements were included in the final release of the NPA.

ARAC tasked the General Structures Harmonization Working Group to harmonize CFR 14 §25.963(e), Fuel tanks – general, with the corresponding requirement in JAR §25.963(g). In addition, the GSHWG was tasked to review and develop harmonized advisory material based on existing guidance presented in AC25.963-1 and ACJ 25.963(g).

(2) What is the underlying safety issue to be addressed in this proposal?

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

The safety issue to be addressed is that of fuel tank access panel integrity in the presence of high speed objects such as tire tread material and/or engine debris following engine failures and in the presence of elevated temperatures due to landing gear and engine fires.

(3) What is the underlying safety rationale for the requirement?

Certain fuel tank access covers, typically on the lower side of the wing surface, are susceptible to impact from high-speed objects such as failed tire tread material and engine debris following engine failures. In addition, certain fuel tank access covers due to their close proximity to landing gear and engines, may be subjected to elevated temperatures due to landing gear or engine fires. Failure of an access cover on a wing fuel tank as a result of impact damage or elevated temperatures from close proximity to a fire source may result in the loss of hazardous quantities of fuel that could subsequently ignite.

(4) Why should the requirement exist?

To minimize the possibility of the loss of hazardous quantities of fuel through access covers impacted by high speed objects such as failed tire tread material and engine debris following engine failure or elevated temperatures as a result of close proximity to a heat source such as landing gear or engine fires.

b. CURRENT STANDARDS OR MEANS TO ADDRESS

(1) If regulations currently exist:

(a) What are the current regulations relative to this subject? (Include both the FAR's and JAR's.)

FAR §25.963(e)(1) and JAR §25.963(g)(1) are identical.

FAR §25.963(e)(2) requires fuel tank access covers to be fire resistant. There is no such requirement in JAR-25. This results in additional compliance demonstration for FAR 25 compared to JAR-25.

Current CFR 14 Part 25 text:

FAR §25.963 Fuel tanks: general

(e) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris.
(2) All covers must be fire resistant as defined in part 1 of this chapter.

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

(Amendment 25-69, 54 FR 40354, Sept. 29, 1989)

AC 25.963-1 dated 7/29/92

1. PURPOSE
This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of FAR §25.963(e).

2. RELATED FAR SECTIONS
The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with FAR §25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of FAR §25.963(e).

3. BACKGROUND
Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE
a. All fuel tank access covers must be designed to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to "minimize penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the airplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.
b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.
(1) Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass traveling at airplane rotation speed (V_R), and distributed over an impact area equal to 1 1/2 percent of the total tread area.
(2) For turbine powered airplanes, covers located within 15 degrees forward of the front engine compressor or fan plane measured from center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from center of rotation, should be evaluated for impact from small fragments (shrapnel) with energies referred to in AC 20-128, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure, issued 3/9/88. The covers need not

be designed to withstand impact from high energy engine fragments such as engine rotor segments or propeller blade fragments.

5. FIRE RESISTANCE
a. All fuel tank access covers must be fire resistant. The definition of fire resistant, as given in Part 1 of the FAR, means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used. For the purpose of complying with this requirement, the access cover is assumed to be subjected to fire from outside the fuel tank. The fuel tank access covers need not be more fire resistant than the contiguous tank structure.
b. Access covers, not as fire resistant as contiguous tank structures, should be tested for five minutes using a burner producing a 2000°F. flame. The test burner and procedures for instrumentation and calibration should be as defined in AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/6/90. The test cover should be installed in a test fixture representative of the actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

Current JAR text: (Amendment 93-1 to Change 13)

JAR §25.963 Fuel tanks: general

(g) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris.
(2) Reserved
(See ACJ 25.963(g))

ACJ 25.963(g)

Fuel Tanks: General (Acceptable Means of Compliance)
See JAR §25.963(g)
1. *Purpose.* This ACJ sets forth an acceptable means of showing compliance with the provisions of JAR-25 dealing with the certification requirements for fuel tank access covers. Guidance information is provided for showing compliance with the impact resistance requirements of §25.963(g).

2. *Background.* Fuel tank access covers have failed in service due to impact with high speed objects such as failed tyre tread material and engine debris following engine failures. Failure of an access cover on a wing fuel tank may result in the loss of hazardous quantities of fuel which could subsequently ignite.

General Structures Harmonization Working Group Report

Fuel Tank Access Covers FAR/JAR §25.963(e)

3. *Impact Resistance*
a. All fuel tank access covers must be designed to minimise penetration and deformation by tyre fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should however, choose to "minimise penetration and deformation" by testing covers using debris of a type, size, trajectory, and velocity that represents conditions anticipated in actual service for the aeroplane model involved. There should be no hazardous quantity of fuel leakage after impact. The access covers, however, need not be more impact resistant than the contiguous tank structure.
b. In the absence of a more rational method, the following criteria should be used for evaluating access covers for impact resistance.
i. Covers located within 15º inboard and outboard of the tyre plane of rotation, measured from the centre plane of tyre rotation with oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tyre tread segments having width and length equal to the full width of the tread, with thickness of the full tread plus casing. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground. Generally, this will be the higher of the aircraft rotation speed (Vr) and the flapless landing speed.
ii. Covers located within 15º forward of the front compressor or fan plane measured from the centre of rotation to 15º aft of the rearmost turbine plane measured from the centre of rotation, should be evaluated for impact from small fragments (shrapnel). The covers need not be designed to withstand impact from high energy engine fragments such as rotor segments."

Note: FAR 121.316 requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of §25.963(e). This requirement however was considered to be beyond the scope of the tasking to the GSWHG, and has therefore not been discussed. JAR-26 currently does not contain an equivalent retro-active requirement.

(b) What has occurred since those regulations were adopted that has caused us to conclude that additional or revised regulations are necessary? Why are those regulations now inadequate?

Harmonization of the requirement would benefit the OEMs and certification authorities. The proposal contained herein is intended to achieve common requirements and interpretative material related to impact requirements for fuel tank access covers, without reducing the safety provided by the regulations below the level that is acceptable to Authorities and Industry.
Harmonisation of JAR-25 and FAR 25 on this subject would yield cost savings by eliminating duplicate certification activities.

2. If no regulations currently exist:

(a) What means, if any, have been used in the past to ensure that this safety issue is addressed? Has the FAA relied on issue papers? Special Conditions? Policy statements? Certification action items? Has the JAA relied on Certification Review Items? Interim Policy? If so, reproduce the applicable text from these items that is relative to this issue.

Not Applicable

(b) Why are those means inadequate? Why is rulemaking considered necessary (i.e., do we need a general standard instead of addressing the issue on a case-by-case basis?)

Not Applicable

2. DISCUSSION of PROPOSAL

- *This section explains:*

→ *what the proposal would require,*

→ *what effect we intend the requirement to have, and*

→ *how the proposal addresses the problems identified in Background.*

- *Discuss each requirement separately. Where two or more requirements are very closely related, discuss them together.*
- *This section also should discuss alternatives considered and why each was rejected.*

a. SECTION-BY-SECTION DESCRIPTION OF PROPOSED ACTION

(1) What is the proposed action? Is the proposed action to introduce a new regulation, revise the existing regulation, or to take some other action?

The proposed action for the rule is to retain the harmonized wording of FAR §25.963(e)(1) / JAR §25.963(eg)(1). In addition, since harmonization could not be reached in regard to requirements for fire resistance, the rule text for FAR §25.963(e)(2) is to be retained and the fire resistance requirements developed by the group no requirements for fire resistance will be incorporated into the JAR in a new sub-paragraph 25.963(e)(2).

In the advisory material, for tire debris, harmonization is achieved by adopting the current AC 25.963-1 guidance on tire fragment spread angle and mass, but adopting the current ACJ 25.963(g) guidance of tire fragment speed. For engine debris, harmonization is achieved by adopting an additional definition of engine debris to be used in the absence of relevant data.

In addition, since harmonization could not be reached in regard to requirements for fire resistance, the advisory text of AC 25.963-1 in regard to fire resistance is to be retained and the no guidance developed within the group in regard to fuel access cover fire resistance will be incorporated into the JAR advisory material of ACJ 25.963(eg).

(2) If regulatory action is proposed, what is the text of the proposed regulation?

FAR §25.963 Fuel tanks: general

(e) Fuel tank access covers must comply with the following criteria in order to avoid loss of hazardous quantities of fuel:
(1) All covers located in an area where experience or analysis indicates a strike is likely, must be shown by analysis or tests to minimize penetration and deformation by tire fragments, low energy engine debris, or other likely debris.
(2) All covers must be fire resistant as defined in part 1 of this chapter. ***(FAR only)***
(2) All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminium alloy in dimensions appropriate for the purpose for which they are to be used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material. ***(JAR only)***
Note: (e)(2) will not appear in the JAR.

(3) If this text changes current regulations, what change does it make? For each change:

- What is the reason for the change?
- What is the effect of the change?

No changes to current FAR regulation text are proposed. Only changes to advisory material are proposed. The JAR regulations will change in that fire resistance requirements for fuel tank access covers will be added, although different than those of the FAR.

(4) If not answered already, how will the proposed action address (i.e., correct, eliminate) the underlying safety issue (identified previously)?

The proposed rule and advisory material both address impact on fuel tank access covers by tire fragments, engine debris, or other likely debris.

The proposed FAR rule and advisory material maintains the previous language and requirements of §25.963(e)(2) and AC 25.963-1 paragraph 5 in regard to fire resistance, although this part of the rule and advisory material will remain un-harmonized with the JAR. The JAR will incorporate the advisory material developed during the group discussions in regard to fire resistance. The FAA, as documented in their comments to NPA 25E-304 which are reproduced below, believes the fire resistance standard

developed by the group and being incorporated into the JAR reduces the level of safety currently required by the FAR.

FAA Comments to JAA NPA 25E-304
Fuel Tank Structural Integrity / Fuel Tank Access Covers

Fuel Tank Access Covers

The ARAC recommendation is to incorporate wording directly into the rule (FAR/JAR 25.963(d)) that would allow the fuel tank access panels to be "equivalent to the adjacent / surrounding skin," rather than meet the fire resistant standard stated in the current FAR. This proposal is a step backward in fuel tank safety, particularly in the post crash fire environment.

The current transport fleet post crash safety record is based upon use of aluminum structures. These structures conduct heat well and are "fire resistant" as defined in FAR 1.1. The fire resistance requirement in FAR 25.963 was introduced because of the use of nylon fuel tank access panels by one manufacturer. These panels suffered severe damage when exposed to underwing fires. The doors were replaced with cast aluminum doors to provide appropriate fire resistance. The impact resistance of fuel tank panels made of cast aluminum, however, was found to cause a safety concern. Therefore, the cast aluminum doors were replaced by doors with improved impact resistance in areas of the wing exposed to tire and uncontained engine debris. FAR 25.963 was amended to require both fire resistance and impact resistance for fuel tank access panels. While this rulemaking addressed the adverse service experience of conventional transport airplanes with fuel tank structures that were made of impact and fire resistant aluminum, the FAA did not foresee the future use of composite structures nor possible development of non-conventional delta wing designs that may significantly reduce the inherent safety of conventional fuel tank designs. Looking back, FAR 25.963 should have established an objective standard for fuel tanks integrity for impact and fire resistance.

The Concorde and other accidents have highlighted the safety implications of damage to fuel tanks from debris or fire. The delta wing design of the Concorde allows the use of lower wing skins made of 1.2 mm titanium. While this material offers excellent fire resistance, the impact resistance was found to be inadequate. The British Midlands 737 event also underscores the need to provide impact resistance for fuel tanks.

In addition, the evolution of airplane structures has resulted in the use of new materials for fuel tank structures. One aspect of these new materials is a possible lessening of their resistance to fire, (e.g. composite horizontal stabilizer fuel tanks).

Based upon the use of new materials and the need to assure fuel tank integrity from both fire and impact damage, the FAA position is that the current FAR 25.963 requirement for the fuel tank access panels to be impact and fire resistant should be applied to the entire external surfaces of the fuel tank. The harmonized rule should not reduce the current level of safety and allow use of doors made of materials that do not meet fire resistance

standards, as defined in FAR/JAR Part 1. The FAA intends to apply special conditions to future airplane designs requiring that both impact resistance and fire resistance are addressed on fuel tanks located in the wing and stabilizer, etc. so that the level of safety achieved by the current transport fleet is not inadvertently reduced by introduction of newer technology materials, or the evolution of airplane designs such as the "Sonic Cruiser".

(5) Why is the proposed action superior to the current regulations?

For impact on fuel tank access covers by tire fragments, engine debris, or other likely debris, the proposed rule and advisory material will maintain the tire fragment mass but increase the spread angle and fragment speed to be considered, compared to the current FAR standard. These adjustments were made based on a rational review of in-service data. The net result is to increase the energy level specified for current FAR standards. These energy levels have been reviewed by the authorities and found to be acceptable as to level of safety.

The current fire resistance requirements in the FAR are maintained, although they remain un-harmonized with the JAR.

b. ALTERNATIVES CONSIDERED

(1) What actions did the working group consider other than the action proposed? Explain alternative ideas and dissenting opinions.

Adoption of the current guidance contained in ACJ 25.963(g) on tire fragment size has been considered, but could not be supported by in service data. Based on data from a tread survey performed by Boeing (1985 -1987) it was determined that the tyre debris model contained in the existing ACJ 25.963(g) is too conservative in terms of tyre debris weight. An important additional consideration is that the tyre debris model of AC 25.963-1 has been applied for many years to the current fleet of large/transport aeroplanes, and it is the opinion of the GSHWG that the application of this model has provided an adequate level of safety. Hence this tyre debris model is proposed in favour of the tyre debris model contained in the existing ACJ 25.963(g).

The velocities used in the tyre debris assessment is proposed as the highest speed that the aircraft is likely to use on the ground under normal operation, in lieu of the text of the existing ACJ 25.963(g) ("the higher of the aircraft rotation speed V_R and the flapless landing speed"). The GSHWG has determined that the probability of occurrence of a flapless landing is sufficiently low to no longer consider the flapless landing speed in the tyre debris assessment.

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In addition, the following draft rule and advisory text was developed to address the fuel tank access panel fire resistance requirements currently specified in FAR §25.963(e)(2) and AC25.963-1 paragraph 5.:

Draft Rule Text for Fuel Access Cover Fire Resistance

All covers must have the capacity to withstand the heat associated with fire at least as well as an access cover made from aluminum alloy in dimensions appropriate for the purpose for which they are used, except that the access covers need not be more resistant to fire than an access cover made from the base fuel tank structural material.

Draft Advisory Material for Fuel Access Cover Fire Resistance

RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of §25.963(e)(2) if they are fabricated from solid aluminum or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Power plant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminum alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as the minimum thickness of the surrounding wing structure.

c) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or-ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5 minutes. The test cover should be installed in a test fixture representative of actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or distortion that would lead to fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

However, based on objections raised by regulatory sources outside the working group, harmonization could not be achieved. Initial objections to any fire resistance

requirements for fuel access covers were received from the PPSG, citing a lack of justification for fire resistant fuel tank covers and questioning the benefits of requiring access covers to be as resistant to fire as the contiguous wing structure, when there is no resistance to fire standard required for the wing itself. After additional discussions, a compromise to the draft harmonized text was developed which was acceptable to the PPSG. Subsequently, the FAA has objected to the draft harmonized text, stating that the proposed text would be a reduction in the level of safety currently required by the FAR. In their objection, the FAA cite the intent of the existing FAA rule is to ensure the fuel access covers would remain intact in a ground fire condition with the assumed wing construction being aluminum. Further, the FAA believe that current rules should be updated to include a minimum fire resistance standard for the fuel tank as well as the current standard for the fuel access covers, but realize this is outside the charter of this harmonization task and would therefore require re-tasking by ARAC. Therefore, the recommendation from the GSHWG is to remain un-harmonized on this issue and refer it back to the TAEIG for disposition and/or re-assignment. Subsequently, the JAA has decided to adopt the fire resistance requirements and guidance material developed by the group into the JAR, reference NPA 25E-304.

(2) Why was each action rejected (e.g., cost/benefit? unacceptable decrease in the level of safety? lack of consensus? etc.)? Include the pros and cons associated with each alternative.

See discussion above.

c. HARMONIZATION STATUS

(1) Is the proposed action the same for the FAA and the JAA?

Yes, in regard to fuel access cover impact requirements. As discussed above, the fire resistance requirements for fuel access covers will remain un-harmonized.

(2) If the proposed action differs for the JAA, explain the proposed JAA action.

The JAA are proposing to adopt the harmonized rule and advisory material text drafted by the GSHWG in regard to fuel access cover impact and fire resistance requirements through NPA 25C-304. No requirements for fuel access cover fire resistance will be incorporated into the JAR at this time.

(3) If the proposed action differs for the JAA, explain why there is a difference between FAA and JAA proposed action (e.g., administrative differences in applicability between authorities).

Based on objections raised by regulatory sources outside the working group, harmonization could not be achieved. Initial objections to any fire resistance requirements for fuel access covers were received from the PPSG, citing a lack of justification for fire resistant fuel tank covers and questioning the benefits of requiring

access covers to be as resistant to fire as the contiguous wing structure, when there is no resistance to fire standard required for the wing itself. After additional discussions, a compromise to the draft harmonized text was developed which was acceptable to the PPSG. Subsequently, the FAA objected to the draft harmonized text, stating that the proposed text would be a reduction in the level of safety currently required by the FAR. In their objection, the FAA cite the intent of the existing FAA rule is to ensure the fuel access covers would remain intact in a ground fire condition with the assumed wing construction being aluminum. Further, the FAA believe that current rules should be updated to include a minimum fire resistance standard for the fuel tank as well as the current standard for the fuel access covers, but realize this is outside the charter of this harmonization task and would therefore require re-tasking by ARAC. Therefore, the recommendation from the GSHWG is to remain un-harmonized on this issue and refer it back to the TAEIG for disposition and/or re-assignment.

3. COSTS AND OTHER ISSUES THAT MUST BE CONSIDERED

The Working Group should answer these questions to the greatest extent possible. What information is supplied can be used in the economic evaluation that the FAA must accomplish for each regulation. The more quality information that is supplied, the quicker the evaluation can be completed.

a. COSTS ASSOCIATED WITH THE PROPOSAL

(1) Who would be affected by the proposed change? How? (Identify the parties that would be materially affected by the rule change – airplane manufacturers, airplane operators, etc.)

Most recent new airplane certification programs have been substantiated using an envelope case involving both FAR and JAR standards for fuel access cover impact resistance. Compared to these enveloped standards the level of energy associated with tire fragments would decrease upon adoption of the new proposed standards. This reduction in energy level is considered acceptable since it is based on the use of rational analysis of in-service data.

The current fuel access cover fire resistance requirements in the FAR are maintained, although they remain un-harmonized with the JAR.

(2) What is the cost impact of complying with the proposed regulation? Provide any information that will assist in estimating the costs (either positive or negative) of the proposed rule.

Comparing the proposal with the current FAR rule and advisory material, no increase or decrease in cost is expected.

b. OTHER ISSUES

(1) Will small businesses be affected? *(In general terms, "small businesses" are those employing 1,500 people or less. This question relates to the Regulatory Flexibility Act of 1980 and the Small Business Regulatory Enforcement Fairness Act of 1996.]*

Small businesses will not be affected.

(2) Will the proposed rule require affected parties to do any new or additional record keeping? If so, explain. *[This question relates to the Paperwork Reduction Act of 1995.]*

No.

(3) Will the proposed rule create any unnecessary obstacles to the foreign commerce of the United States -- i.e., create barriers to international trade? *[This question relates to the Trade Agreement Act of 1979.]*

No.

(4) Will the proposed rule result in spending by State, local, or tribal governments, or by the private sector, that will be $100 million or more in one year? *[This question relates to the Unfunded Mandates Reform Act of 1995.]*

No.

4. ADVISORY MATERIAL

a. Is existing FAA or JAA advisory material adequate? Is the existing FAA and JAA advisory material harmonized?

The existing FAA and JAA advisory material is adequate to address the underlying safety concerns, but harmonization in regard to fuel access cover impact damage can only be achieved by adoption of the proposed advisory material presented in subparagraph c below.

The existing FAA advisory material in regard to fuel access cover fire resistance remains un-harmonized with the JAR. Harmonization in regard to fuel access cover fire resistance cannot be achieved until the issue of fire resistance for the fuel tanks in general is addressed through a separate harmonization effort.

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b. If not, what advisory material should be adopted? Should the existing material be revised, or should new material be provided?

The harmonized advisory material developed by the GSHWG for fuel access cover impact requirements as presented in subparagraph c below should be adopted.

The existing FAA advisory material in regard to fuel access cover fire resistance remains un-harmonized with the JAR. The JAR will incorporate the advisory material developed during the group discussions in regard to fire resistance.

c. Insert the text of the proposed advisory material here (or attach), or summarize the information it will contain, and indicate what form it will be in (e.g., Advisory Circular, Advisory Circular – Joint, policy statement, FAA Order, etc.)

The following revised guidance material is recommended in regard to fuel access cover impact requirements.

Fuel Tank Access Doors
AC 25.963-1
May 19, 1999

1. PURPOSE. This advisory circular (AC) sets forth a means of compliance with the provisions of Part 25 of the Federal Aviation Regulations (FAR) dealing with the certification requirements for fuel tank access covers on turbine powered transport category airplanes. Guidance information is provided for showing compliance with the impact and fire resistance requirements of 25.963(e).

2. RELATED FAR SECTIONS. The contents of this AC are considered by the FAA in determining compliance of the fuel tank access covers with 25.963(e). Section 121.316 also requires each turbine-powered transport category airplane operated in air carrier or commercial service after October 30, 1991, to meet the standards of 25.963(e).

3. BACKGROUND. Fuel tank access covers have failed in service due to impact with high speed objects such as failed tire tread material and engine debris following engine failures. Failure of an access cover on a fuel tank may result in loss of hazardous quantities of fuel which could subsequently ignite.

4. IMPACT RESISTANCE.

a) All fuel tanks access covers must be designed to minimise penetration and deformation by tire fragments, low energy engine debris, or other likely debris, unless the covers are located in an area where service experience or analysis indicates a strike is not likely. The rule does not specify rigid standards for impact resistance because of the wide range of likely debris which could impact the covers. The applicant should, however, choose to “minimize penetration and deformation” by analysis or test of covers using debris of a type, size, trajectory and velocity that represents conditions anticipated in actual service for airplane model involved. There should be no hazardous quantity of fuel leakage after impact. It may not be practical or even necessary to provide access covers

with properties which are identical to those of the adjacent skin panels since the panels usually vary in thickness from station to station and may, at certain stations, have impact resistance in excess of that needed for any likely impact. The access covers, however, need not be more impact resistant than the average thickness of the adjacent tank structure at the same location, had it been designed without access covers. In the case of resistance to tire debris, this comparison should be shown by tests or analysis supported by test.

b) In the absence of a more rational method, the following may be used for evaluating access covers for impact resistance to tire and engine debris.

i) Tire Debris - Covers located within 30 degrees inboard and outboard of the tire plane of rotation, measured from center of tire rotation with the gear in the down and locked position and the oleo strut in the nominal position, should be evaluated. The evaluation should be based on the results of impact tests using tire tread segments equal to 1 percent of the tire mass distributed over an impact area equal to 1½ percent of the total tread area. The velocities used in the assessment should be based on the highest speed that the aircraft is likely to use on the ground under normal operation.

ii) Engine Debris - Covers located within 15 degrees forward of the front engine compressor or fan plane measured from the center of rotation to 15 degrees aft of the rearmost engine turbine plane measured from the center of rotation, should be evaluated for impact from small fragments. The evaluation should be made with energies referred to in AC 20-128A, Design Considerations for Minimizing Hazards Caused by Uncontained Turbine Engine and Auxiliary Power Unit Rotor and Fan Blade Failure. The covers need not be designed to withstand impact from high-energy engine fragments such as engine rotor segments or propeller fragments. In the absence of relevant data, an energy level corresponding to the impact of a 3/8 inch cube steel debris at 700fps, 90 degrees to the impacted surface or area should be used.
(For clarification, engines as used in this advisory material is intended to include engines used for thrust and engines used for auxiliary power, APU.)

The following guidance material in regard to fuel access cover fire resistance requirements is the same as the existing AC for the FAR but incorporates the draft text developed by the GSHWG for the JAR.

(The following wording is for the FAR only – same as the existing AC)

5. FIRE RESISTANCE.

a. All fuel tank access covers must be fire resistant. The definition of fire resistant, as given in Part 1 of the FAR, means the capacity to withstand the heat associated with fire at least as well as aluminum alloy in dimensions appropriate for the purpose for which they are used. For the purpose of complying with this requirement, the access cover is assumed to be subjected to fire from outside the fuel tank. The fuel tank access covers need not be more fire resistant than the contiguous tank structure.

b. Access covers, not as fire resistant as contiguous tank structures, should be tested for five minutes using a burner producing a 2000°F flame. The test burner and procedures for instrumentation and calibration should be as defined in AC 20-135, Powerplant

Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/6/90. The test cover should be installed in a test fixture representative of the actual installation in the airplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

(The following wording is for the JAR only)

4. RESISTANCE TO FIRE. Fuel tank access covers meet the requirements of JAR 25.963(e)(2) if they are fabricated from solid aluminium or titanium alloys, or steel. They also meet the above requirement if one of the following criteria is met.

a) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as an equivalent aluminium alloy in dimensions appropriate for the purpose for which they are used.

b) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of time at least as great as the minimum thickness of the surrounding wing structure.

c) The covers can withstand the test of AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria, issued 2/9/90, or ISO 2685-1992(E), Aircraft - Environment conditions and test procedures for airborne equipment - Resistance to fire in designated fire zones, for a period of 5 minutes. The test cover should be installed in a test fixture representative of actual installation in the aeroplane. Credit may be allowed for fuel as a heat sink if covers will be protected by fuel during all likely conditions. The maximum amount of fuel that should be allowed during this test is the amount associated with reserve fuel. Also, the static fuel pressure head should be accounted for during the burn test. There should be no burn-through or distortion that would lead to fuel leakage at the end of the tests; although damage to the cover and seal is permissible.

MAR 8 2004

Mr. Craig Bolt
Assistant Chair, Transport Airplanes and
Engines Issues Area
400 Main Street, MS 162-14
East Hartford, CT 01608

Dear Mr. Bolt,

This letter responds to several letters from the Aviation Rulemaking Advisory Committee (ARAC) on Transport Airplanes and Engines (TAE) during calendar year 2003.

Date of Letter: May 14

Purpose: A request for economic support for a proposed part 25 rulemaking addressing ice protection systems.

FAA Action/Status: Kathy Ishimaru, the Federal Aviation Administration (FAA) representative on the Ice Protection Harmonization Working Group, and George Thurston of the FAA Policy Office indicated that Mr. Thurston has already provided the economic data to the working group. No further action is warranted.

Date of Letter: July 22

Purpose: Transmittal package with opposing views related to the ease of search task from the members of the Design for Security Harmonization Working Group.

FAA Action/Status: At the June TAE ARAC meeting, after learning the working group could not reach consensus, Mr. Kaszycki asked the working group to document its views and forward the package to the FAA through ARAC. The package has since been forwarded to the Transport Airplane Directorate for review and decision.

We may request the working group to help us dispose of substantive comments once the comment period for the notice of proposed rulemaking closes. Hence, we consider the working group to be in existence, but in-active until further notice.

This letter also acknowledges receipt of several recommendation packages:

Date of Letter	Task No.	Description of Recommendation	Working Group
Sep 18	7	Working group report with a long term plan addressing the effects of multiple complex structural supplemental type certification modifications on the structural integrity and continued safe operations of transport category	Airworthiness Assurance

		airplanes	
Sep 19	11	Working group report that provides language for a requirement to substantiate the operation of the airplane control systems is not adversely affected (jamming, friction, disconnection, damage) by the presence of deflections of the airplane structure due to the separation of pitch, roll, and yaw limit maneuver loads (25.683)	General Structures Harmonization
	9	Working group report that provides harmonized rule language and advisory material for fuel tank access cover impact resistance (§ 25.963(e))	
Oct 21	3, Part 1	Working group report addressing ventilation (heating and humidity), § 25.831(g)	Mechanical Systems Harmonization
Oct 21	3, Part 2	Working group report addressing cabin pressurization, § 25.841(a)	Mechanical Systems Harmonization
Oct 22	5	Working group report that provides harmonized § 25.571 language and accompanying advisory material for damage tolerance and fatigue evaluation of structure	General Structures Harmonization
Oct 22	6	Working group reports on widespread fatigue damage that address training syllabus, multiple element damage, and mandatory modifications	Airworthiness Assurance

I wish to thank ARAC and the working groups for the resources that industry gave to develop these recommendations. Since we consider submittal of the recommendation as completion of the tasks, we have closed the tasks, and placed the recommendations on the ARAC website at http://www1.faa.gov/avr/arm/arac/aracTransportAirplane.cfm?nav=6. The recommendation packages have been forwarded to the Transport Airplane Directorate for review and decision. We will continue to keep you apprised of our efforts on the ARAC recommendation at the regular ARAC meeting.

Sincerely,

Original Signed By
Nicholas A. Sabatini

Nicholas A. Sabatini
Associate Administrator for Regulation
and Certification

ARM-209:Eupshaw;fs:1/9/04; PC Docs #20579
cc: ARM-1/20/200/209; AIR-100; ANM-110
File #ANM-01-024-A; ANM-00-083-A; ANM-98-466-A; ANM-01-111-A; ANM-95-195-A.; ANM-99-969-A
Control Nos. 20032768-0, 20033095-0, 20033096-0, 20033097-0, 20033098-0, 20033099-0

Rules and Regulations

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Thursday, October 2, 2014

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

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

RIN 2120–AK13

Harmonization of Airworthiness Standards—Miscellaneous Structures Requirements

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

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

DATES: Effective December 1, 2014.

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

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

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

SUPPLEMENTARY INFORMATION:

Authority for This Rulemaking

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

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

I. Overview of Final Rule

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

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

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

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

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

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

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

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

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

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

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

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

II. Background

A. Statement of the Problem

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

B. Summary of the NPRM

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

C. General Overview of Comments

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

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

III. Discussion of Public Comments and Final Rule

A. Section 25.307, Proof of Structure

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

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

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

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

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

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

B. Section 25.621, Casting Factors

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

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

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

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

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

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

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

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

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

C. Section 25.683, Operation Tests

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

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

D. Section 25.721, Landing Gear—General

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

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

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

E. Section 25.787, Stowage Compartments

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

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

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

F. Section 25.963, Fuel Tanks: General

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

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

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

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

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

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

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

G. Section 25.994, Fuel System Components

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

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

H. Advisory Material

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

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

IV. Regulatory Notices and Analyses

A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96–354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Pub. L. 96–39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this final rule.

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

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

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

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

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

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

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

B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Pub. L. 96–354) (RFA) establishes ''as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration.'' The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

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

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

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

C. International Trade Impact Assessment

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

D. Unfunded Mandates Assessment

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

E. Paperwork Reduction Act

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

F. International Compatibility and Cooperation

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

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

G. Environmental Analysis

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

V. Executive Order Determinations

A. Executive Order 13132, Federalism

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

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

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

VI. How To Obtain Additional Information

A. Rulemaking Documents

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

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

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

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

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

B. Comments Submitted to the Docket

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

C. Small Business Regulatory Enforcement Fairness Act

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

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends chapter I of title 14, Code of Federal Regulations, as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

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

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

■ 2. Amend § 25.307 by revising paragraph (a) to read as follows:

§ 25.307 Proof of structure.

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

* * * * *

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

§ 25.621 Casting factors.

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

* * * * *

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

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

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

(ii) Each casting receives:

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

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

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

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

(i) Each casting receives:

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

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

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

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

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

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

(i) Each casting receives:

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

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

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

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

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

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

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

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

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

(ii) Each casting receives:

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

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

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

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

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

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

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

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

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

■ 4. Revise § 25.683 to read as follows:

§ 25.683 Operation tests.

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

(1) Jamming;

(2) Excessive friction; and

(3) Excessive deflection.

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

(1) Jamming;

(2) Excessive friction;

(3) Disconnection; and

(4) Any form of permanent damage.

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

■ 5. Revise § 25.721 to read as follows:

§ 25.721 General.

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

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

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

(i) With the landing gear fully retracted; and

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

(2) Sliding on the ground, with—

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

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

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

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

§ 25.787 Stowage compartments.

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

(1) Cause direct injury to occupants;

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

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

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

* * * * *

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

§ 25.963 Fuel tanks: general.

* * * * *

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

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

$$P = K\rho gL$$

Where—

P = fuel pressure at each point within the tank

ρ = typical fuel density

g = acceleration due to gravity

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

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

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

K = 1.5 for the aft loading condition

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

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

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

K = 6 for the downward loading condition

K = 3 for the upward loading condition

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

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

(ii) The lesser of the two following conditions:

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

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

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

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

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

* * * * *

■ 8. Revise § 25.994 to read as follows:

§ 25.994 Fuel system components.

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

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

Michael P. Huerta,

Administrator.

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

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

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

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

Correction

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

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

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

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

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

BILLING CODE 1505–01–P

DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 117

[Docket No. USCG–2014–0848]

Drawbridge Operation Regulation; Sacramento River, Rio Vista, CA

AGENCY: Coast Guard, DHS.

ACTION: Notice of deviation from drawbridge regulation.

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

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

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

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

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

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

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