Federal Aviation Administration – Regulations and Policies
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Electrical Systems Harmonization Working Group

Task 3 – Harmonize 14 CFR Part 25.869(a), 25.1355(c), 25.1353, 25.2357, 25.1363 and 25.1360(a) and (b)

Task Assignment

[Federal Register: November 26, 1999 (Volume 64, Number 227)]
[Notices]
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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

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

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

ACTION: Notice of new and revised 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) and of revisions to a number of existing tasks. This notice informs the public of the activities of ARAC.

FOR FURTHER INFORMATION CONTACT: Dorenda Baker, Transport Airplane Directorate, Aircraft Certification Service (ANM-110), 1601 Lind Avenue, SW., Renton, WA 98055; phone (425) 227-2109; 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

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airplanes and engines in 14 CFR parts 25, 33, and 35 and parallel provisions in 14 CFR parts 121 and 135. The corresponding Canadian standards are contained in Parts V, VI, and VII of the Canadian Aviation Regulations. The corresponding European standards are contained in Joint Aviation Requirements (JAR) 25, JAR-E, JAR-P, JAR-OPS-Part 1, and JAR-26.

As proposed by the U.S. and European aviation industry, and as

agreed between the Federal Aviation Administration (**FAA**) and the European Joint Aviation Authorities (JAA), an accelerated process to reach harmonization has been adopted. This process is based on two procedures:

(1) Accepting the more stringent of the regulations in Title 14 of the Code of Federal Regulations (FAR), Part 25, and the Joint Airworthiness Requirements (JAR); and

(2) Assigning approximately 41 already-tasked significant regulatory differences (SRD), and certain additional part 25 regulatory differences, to one of three categories:

<bullet> Category 1--Envelope
<bullet> Category 2--Completed or near complete
<bullet> Category 3--Harmonize

The Revised Tasks

ARAC will review the rules identified in the ``FAR/JAR 25 Differences List,'' dated June 30, 1999, and identify changes to the regulations necessary to harmonize part 25 and JAR 25. ARAC will submit a technical report on each rule. Each report will include the cost information that has been requested by the **FAA**. The tasks currently underway in ARAC to harmonize the listed rules are superseded by this tasking.

New Tasks

The **FAA** has submitted a number of new tasks for the Aviation Rulemaking Advisory Committee (ARAC), Transport Airplane and Engine Issues. As agreed by ARAC, these tasks will be accomplished by existing harmonization working groups. The tasks are regulatory differences identified in the above-referenced differences list as Rule type = P-SRD.

New Working Group

In addition to the above new tasks, a newly established Cabin Safety Harmonization Working Group will review several FAR/JAR paragraphs as follows:

ARAC will review the following rules and identify changes to the regulations necessary to harmonize part 25 and JAR:

(1) Section 25.787;
(2) Section 25.791(a) to (d);
(3) Section 25.810;
(4) Section 25.811;
(5) Section 25.819; and
(6) Section 25.813(c).

ARAC will submit a technical report on each rule. Each report will include the cost information that has been requested by the **FAA**.

The Cabin Safety Harmonization Working Group would be expected to complete its work for the first five items (identified as Category 1 or 2) before completing item 6 (identified as Category 3).

Schedule

Within 120 days of tasking/retasking:

<bullet> For Category 1 tasks, ARAC submits the Working Groups' technical reports to the **FAA** to initiate drafting of proposed rulemaking documents.

<bullet> For Category 2 tasks, ARAC submits technical reports, including already developed draft rules and/or advisory materials, to the **FAA** to complete legal review, economic analysis, coordination, and issuance.

June 2000: For Category 3 tasks, ARAC submits technical reports including draft rules and/or advisory materials to the **FAA** to complete legal review, economic analysis, coordination, and issuance.

ARAC Acceptance of Tasks

ARAC has accepted the new tasks and has chosen to assign all but one of them to existing harmonization working groups. A new Cabin Safety Harmonization Working Group will be formed to complete the remaining tasks. The working groups serve as staff to ARAC to assist ARAC in the analysis of the assigned tasks. Working group recommendations must be reviewed and approved by ARAC. If ARAC accepts a working group's recommendations, it forwards them to the **FAA** and ARAC recommendations.

Working Group Activity

All working groups are expected to comply with the procedures adopted by ARAC. As part of the procedures, the working groups are expected to accomplish the following:

1. Document their decisions and discuss areas of disagreement, including options, in a report. A report can be used both for the enveloping and for the harmonization processes.

2. If requested by the **FAA**, provide support for disposition of the comments received in response to the NPRM or review the **FAA**'s prepared disposition of comments. If support is requested, the Working Group will review comments/disposition and prepare a report documenting their recommendations, agreement, or disagreement. This report will be submitted by ARAC back to the **FAA**.

3. Provide a status report at each meeting of ARAC held to consider Transport Airplane and Engine Issues.

Partcipation in the Working Groups

Membership on existing working groups will remain the same, with the formation of subtask groups, if appropriate. The Cabin Safety Harmonization Working Group will be composed of technical experts having an interest in the assigned task. A working group member need not be a representative of a member of the full committee.

An individual who has expertise in the subject matter and wishes to become a member of the Cabin Safety Harmonization Working Group should write to the person listed under the caption FOR FURTHER INFORMATION CONTACT expressing that desire, describing his or her interest in the tasks, and stating the expertise he or she would bring to the working group. All requests to participate must be received no later than December 30, 1999. The requests will be reviewed by the assistant chair, the assistant executive director, and the working group chair, and the individuals will be advised whether or not the request can be accommodated.

Individuals chosen for membership on the Cabin Safety Harmonization Working Group will be expected to represent their aviation community segment and participate actively in the working group (e.g., attend all meetings, provide written comments when requested to do so, etc.). They also will be expected to devote the resources necessary to ensure the ability of the working group to meet any assigned deadline(s). Members are expected to keep their management chain advised of working group activities and decisions to ensure that the agreed technical solutions do not conflict with their sponsoring organization's position when the subject being negotiated is presented to ARAC for a vote.

Once the working group has begun deliberations, members will not be added or substituted without the approval of the assistant chair, the assistant executive director, and the working group chair.

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.

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Meetings of ARAC will be open to the public. Meetings of the working groups 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 November 19, 1999.

Anthony F. Fazio,

Executive Director, Aviation Rulemaking Advisory Committee.

[FR Doc. 99-30774 Filed 11-24-99; 8:45 am]

BILLING CODE 4910-13-M

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 Recommendations

Reference: 1) ARAC Tasking, Federal Register, November 19, 1999
2) TAEIG Letter to FAA, dated March 10, 2000

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 1 tasking. These reports have been prepared by the Electrical Systems HWG.

- 25X899 - Corrected report, previously submitted per Reference 2
- 25X1360 ~ #3
- 25.1351d #1
- 25.1363 #3

Sincerely yours,

Craig R. Bolt

Craig R. Bolt
Assistant Chair, TAEIG

Attachments

Copy: Kris Carpenter - FAA-NWR
*Brian Overhuls - Boeing
* Effie Upshaw - FAA Washington, DC

*letter only

CRB08_040400

Recommendation

Bundled out ANM-00-228-A 230-A

PARENT ANM-00-087-A TASKES

ANM-00-229-A
TAE
Elec Systems

ARAC ESHWG REPORT 25.1353(d)

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

The rule gives design requirements relating to the installation of aircraft electrical wiring. All wire and equipment installations must provide for continuous fault protection against fire and smoke hazards, there must be permanent cable, connector and terminal identification and the risk of mechanical, fluid, heat or vapor damage must be minimized.

2 - What are the current FAR and JAR standards?

Current FAR text:

There is no current FAR rules text.

Current JAR text:

JAR 25.1353(d)

(d) Electrical cables and cable installations must be designed and installed as follows:

(1) The electrical cables used must be compatible with the circuit protection devices required by JAR 25.1357, such that a fire or smoke hazard cannot be created under temporary or continuous fault conditions.
(2) Means of permanent identification must be provided for electrical cables, connectors and terminals.
(3) Electrical cables must be installed such that the risk of mechanical damage and/or damage caused by fluids, vapors or sources of heat, is minimized.

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

JAR 25.1353(d) provides very explicit aircraft installation design requirements for electrical cables.
FAR 25.1353(a), (b) and (c) does not address these design features.

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

The JAR states specific requirements for cable installations that must be met. Installation designs approved by the FAR's typically meet the JAR requirement. Installation designers through experience have adopted the practice of permanent identification, protection and installation routing to minimize the risk of damage to electrical cables.

5 – What is the proposed action?

Adoption of JAR 25.1353(d) in its entirety is recommended. This requires an appropriate design action to be taken, removes the possibility that a designer may not consider a critical installation design condition and is in line with current best design practices.

6 - What should the harmonized standard be?

Electrical cables and cable installations must be designed and installed as follows:

(1) The electrical cables used must be compatible with the circuit protection devices required by FAR/JAR 25.1357, such that a fire or smoke hazard cannot be created under temporary or continuous fault conditions.

(2) Means of permanent identification must be provided for electrical cables, connectors and terminals.

(3) Electrical cables must be installed such that the risk of mechanical damage and/or damage caused by fluids, vapors or sources of heat, is minimized.

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

As mentioned in 5 above, the proposal clarifies the cable design requirements ensuring that the designer considers the critical conditions, routings and markings of a proper installation.

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

As Installation designs approved by the FAR's typically meet the JAR requirement the level of safety is maintained.

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

As Installation designs in current industry practice typically meet the JAR requirement, the level of safety is maintained.

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

Since no equivalent FAR exists, the JAR is proposed for adoption.

11 - Who would be affected by the proposed change?

The proposal is in line with current design practices and the effect of the change is considered to be minimal for Aircraft Operators, Modification Centers, Service Centers and Manufacturers.

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

None.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

The rule is self-explanatory and is supported by a variety of part 25 section rules. Therefore it does not require advisory material.

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

As the proposal is in line with current design practices the cost impact will be negligible.

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

The ESHWG considers that the fast track harmonization process is appropriate for this proposed rule.

parent ANM-00-087-A
Bundled w/ ANM-00-230-A
ANM-00-229-A

ANM-00-228-A
TAE
Electrical Sys
HWG

ARAC ESHWG REPORT 25.1353(a)

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

FAR/JAR give requirements relating to electrical installation including equipment, controls and wiring.

2 - What are the current FAR and JAR standards?

Current FAR text:

Electrical equipment, controls, and wiring must be installed so that operation of any one unit or system of units will not adversely affect the simultaneous operation of any other electrical unit or system essential to the safe operation.

Current JAR text:

Electrical equipment, controls, and wiring must be installed so that operation of any one unit or system of units will not adversely affect the simultaneous operation of any other electrical unit or system essential to the safe operation. Any electrical interference likely to be present in the aeroplane must not result in hazardous effects upon the aeroplane or its systems except under extremely remote conditions. (See ACJ 25.1353 (a).)

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

Both texts require that operation of any one unit or system will not adversely affect the simultaneous operation of any other electrical unit or system essential to safe operation under normal operating conditions. The JAR text also considers failure effects on the aeroplane or its systems and is therefore considered to be more stringent. JAR 25 1353(a) with its related ACJ 25.1353(a) provides a clarification in the intent of the requirement.

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

No specific means of compliance is furnished in the FAR. JAR has a specific ACJ to establish a list of possible sources of interference and reference to JAR 25-1309 to be considered and used for means of compliance.

ACJ 25.1353(a) Electrical Equipment and Installations (Interpretative Material) See JAR 25.1353(a).

The possible sources of interference to be considered should include

a. Conducted and radiated interference caused by electrical noise generation from apparatus connected to the busbars,

b. Coupling between electrical cables or between cables and aerial feeders,

c. Malfunctioning of electrically-powered apparatus,

d. Parasitic currents and voltages in the electrical distribution and earth systems, including the effects of lightning currents or static discharge,

e. Difference frequencies between generating or other systems, and

f. The requirements of JAR 25.1309 should also be satisfied.

5 – What is the proposed action?

Adoption of JAR 25-1353 (a) and associated ACJ.

6 - What should the harmonized standard be?

The current standard of JAR 25.1353(a) and associated ACJ.

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

The proposal extends the requirement to include failure conditions and establishes the means of compliance.

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

By extending the requirement to include failure conditions and adding clarification the proposed standard will increase safety.

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

The proposal is in line with current industry practice and improves the understanding of the requirement.

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

FAR adoption was considered, however for the reasons as stated above the JAR with associated ACJ was retained.

11 - Who would be affected by the proposed change?

As the proposal is in line with the current design practices, the effect is considered to be minimum for aircraft operators and manufacturers affected by this change

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

The current ACJ of JAR 25.1353(a) is proposed to be introduced in FAR as advisory material.

13 - Is existing FAA advisory material adequate?

There is no current published FAA advisory material. It is recommended that the JAR ACJ to 25.1353(a) be adopted in FAR.

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

The proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

As the proposal is in line with standard design practices the cost impact is negligible.

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 the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process? Explain.

The ESHWG considers that the fast track process is appropriate.

ARAC ESHWG REPORT 25.1353(c)(5)

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

The FAR/JAR gives requirements relating to the design and installation of nickel cadmium storage batteries.

2 - What are the current FAR and JAR standards?

Current FAR text:

Section 25.1353 Electrical Equipment and Installations

(c) Storage batteries must be designed and installed as follows -

(5) Each nickel cadmium battery installation capable of being used to start an engine or auxiliary power unit must have provisions to prevent any hazardous effect on structure or essential systems that may be cause by the maximum amount of heat the battery can generate during a short circuit of the battery or of individual cells.

Current JAR text:

JAR 25.1353 Electrical equipment and installations

(c) Storage batteries must be designed and installed as follows –

(5) Each nickel cadmium battery installation must have provisions to prevent any hazardous effect on structure or essential systems that may be cause by the maximum amount of heat the battery can generate during a short circuit of the battery or of individual cells.

~~*3 - What are the differences in the standards and what do these differences result in?*~~

JAR 25.1353(c)(5) requires provisions to prevent any hazardous effect on structure or essential systems by all nickel cadmium batteries regardless of their capabilities; whereas FAR 25.1353(c)(5) requires provisions only for the batteries capable of being used to start an engine or auxiliary power unit.

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

All nickel cadmium batteries are required to show compliance to the JAR 25.1353(c)(5) requirements. Whereas FAR 25.1353(c)(5) requires only batteries with engine and APU start capability to show compliance.

5 – What is the proposed action?

The proposed action is to adopt JAR 25.1353(c)(5). This allows for coverage of the greater range of battery sizes and capabilities.

6 - What should the harmonized standard be?

(c) Storage batteries must be design and installed as follows –

(5) Each nickel cadmium battery installation must have provisions to prevent any hazardous effect on structure or essential systems that may be cause by the maximum amount of heat the battery can generate during a short circuit of the battery or of individual cells.

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

Safety is ensured for the design and installation of nickel cadmium batteries regardless of their sizes and capabilities.

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

By covering all nickel cadmium battery sizes, the safety will be increased.

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

This proposal is in line with current industry practice for aircraft main batteries used for engine or APU starting, however in relation to all other nickel cadmium batteries, the level of safety may be increased.

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

The adoption of FAR was considered however for the reasons as stated above JAR was selected.
The ESHWG considered deletion of the reference to "Nickel Cadmium" batteries so that the rule would apply to all battery types. This change was not adopted because it does not fit within the fast track harmonization guidelines and would require additional evaluation of the impact on other battery types.

11 - Who would be affected by the proposed change?

As stated above for main batteries the proposal is in line with current design practices and therefore the effect is considered to be minimal. There may be an impact on other nickel cadmium battery installations by aircraft operators, manufacturers and modifiers.

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

None.

13 - Is existing FAA advisory material adequate?

There are no current published FAA or JAA advisory materials

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

As the proposal is in line with current design practices for aircraft main batteries the cost impact will be negligible. There may be an impact on other nickel cadmium battery installations by aircraft operators, manufacturers and modifiers.

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

The ESHWG considers that the fast track harmonization process is appropriate for this rule.

ARAC ESHWG REPORT 25.1353(c)(6)

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

FAR/JAR give requirements relating to nickel cadmium battery installations with regard to protection against battery overheating.

2 - What are the current FAR and JAR standards?

Current FAR text:

Section 25.1353(c)(6)

(6) Nickel cadmium battery installations capable of being used to start an engine or auxiliary power unit must have -

(i) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(ii) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(iii) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure.

Current JAR text:

JAR 25.1353(c)(6)

(6) Nickel cadmium battery installations that are not provided with low-energy charging means must have-

(i) A system to control the charging rate of the battery automatically so as to prevent battery overheating;

(ii) A battery temperature sensing and over-temperature warning system with a means for disconnecting the battery from its charging source in the event of an over-temperature condition; or

(iii) A battery failure sensing and warning system with a means for disconnecting the battery from its charging source in the event of battery failure. [(See ACJ 25.1353 (c)(6)(ii) and (iii).)]

Note: The existing text of JAR 25.1353(c)(6) is such that some confusion exists in the interpretation of the relationship of paragraphs (i) and (ii). JAA Temporary Guidance Material TGM/25/03 was issued to correct the interpretation between these paragraphs. The correct interpretation between JAR 25.1353(c)(6)(i) and JAR 25.1353(c)(6)(ii) is that an 'OR' is to be placed between the two paragraphs.

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

JAR 25.1353(c)(6), with its related ACJ 25.1353(c)(6), provides requirements for all nickel cadmium battery installations (not provided with a low energy charging means) in addition to those provided for engine or APU starting.

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

All nickel cadmium battery installations (not provided with a low energy charging means) are required to show compliance to the JAR 25.1353(c)(6) requirements.
There is no published FAA advisory material for this requirement. JAR has a specific ACJ to address the maintenance requirements of temperature sensing and over-temperature warning devices installed to cover the requirements of 25.1353(c)(6) paragraphs (ii) or (iii).

5 – What is the proposed action?

Adoption of JAR 25.1353(c)(6) and associated ACJ. This proposed action provides for greater coverage by including all nickel cadmium battery installations, irrespective of whether provided for engine or APU starting. Service experience has shown that any battery installation can, if not carefully controlled, result in an overheat or fire condition. This is also in line with current design practices.

6 - What should the harmonized standard be?

The current standard of JAR 25.1353(c)(6) with incorporation of JAA TGM/25/03 (see 2 above) and its associated ACJ.

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

As mentioned in 5 above, the proposal expands the requirement to cover all nickel cadmium battery installations addressing the underlying safety concern of battery overheat and/or fire.

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

By expanding the requirement to include all nickel cadmium batteries regardless of their use, the level of safety is increased.

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

This proposal is in line with current industry practice for aircraft main batteries used for engine or APU starting, however in relation to all other nickel cadmium batteries the level of safety may be increased.

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

The adoption of FAR was considered however for the reasons as stated above JAR was selected.

11 - Who would be affected by the proposed change?

As stated above for batteries used for engine or APU starting the proposal is in line with current design practices and therefore the effect is considered to be minimal. There may be an impact on other nickel cadmium battery installations by aircraft operators, manufacturers and modifiers .

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

None.

13 - Is existing FAA advisory material adequate?

There is no current published FAA Advisory Material. It is recommended that the JAR ACJ to 25.1353(c)(6) be adopted by FAA as advisory material.

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

As the proposal is in line with current design practices for aircraft main batteries the cost impact will be negligible. There may be an impact on other nickel cadmium battery installations by aircraft operators, manufacturers and modifiers.

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

The ESHWG considers that the fast track harmonization process is appropriate for this rule.

Bundled with other See ANM-00-087-A #4

ANM-00-231-A
TAE
Elec Sys
TASK #3

ARAC ESHWG REPORT 25.1355 (c)

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

The FAR/JAR gives requirements relating to the arrangement, protection and control of the electrical feeders from the busbars to the distribution points. The divisions of loads among the feeders shall be such that no single fault occurring in any feeder or associated control circuit will hazard the aeroplane.

2 - What are the current FAR and JAR standards?

Current FAR text:

Section 25.1355(c)

(c) If two independent sources of electrical power for particular equipment or systems are required by this chapter, in the event of the failure of one power source for such equipment or system, another power source (including its separate feeder) must be automatically provided or be manually selectable to maintain equipment or system operation.

Current JAR text:

JAR 25.1355(c)

(c) If two independent sources of electrical power for particular equipment or systems are required by this JAR-25, in the event of the failure of one power source for such equipment or system, another power source (including its separate feeder) must be automatically provided or be manually selectable to maintain equipment or system operation. (See ACJ 25.1355 (c) and ACJ No. 6 to JAR 25.1309.)

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

The FAR refers to "chapter" while the JAR refers to "JAR 25" in the rule text. The FAR reference to "chapter" implies broader coverage. The JAR also refers to advisory material.

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

There are no differences in the means of compliance, however the JAR has specific ACJ's as follows:
The ACJ to JAR 25.1355(c) introduced Interpretative Material concerning the segregation of electrical feeders to minimize the possibility of cascade or multiple failures. In addition, ACJ No. 6 to JAR 25.1309 refers to the same objective but in relation to the installation of the equipment and systems rather than the electrical feeders only. Segregation of electrical cable bundles or groups of hydraulic pipes being examples that are explicitly quoted.

5 – What is the proposed action?

In line with the fast track harmonization process, the FAR with text changes identified in Item 6 is to be adopted.

6 - What should the harmonized standard be?

FAR/JAR 25.1355(c)

If two independent sources of electrical power for particular equipment or systems are required for certification or by operating rules, in the event of the failure of one power source for such equipment or system, another power source (including its separate feeder) must be automatically provided or be manually selectable to maintain equipment or system operation.

(See ACJ 25.1355 (c) and ACJ No. 6 to JAR 25.1309.) This reference applies to JAR only.
Note: ACJ No 6 to 25.1309 is likely to become ACJ 25.1310(a) if the proposed adoption of FAR/JAR 25.1310 takes place.

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

Regulation remains unchanged.

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

The level of safety is maintained whilst providing clarification in the form of acceptable means of compliance.

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

The level of safety is maintained whilst providing clarification in the form of acceptable means of compliance.

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

Adoption of JAR was considered, however for reasons as stated above, the FAR text was selected together with JAR Interpretative material.

11 - Who would be affected by the proposed change?

As proposal is in line with current design practices, there should be minimal effect on operators or manufacturers.

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

None.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

As no equivalent Advisory Material exists, it is recommended that the current ACJ to JAR 25.1355(c) and ACJ No 6 to JAR 25.1309 be retained and adopted as FAA advisory material.

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems..

15 - Does the proposed standard affect other HWG's?

No.

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

As the proposal is in line with existing regulations and current design practice, the cost impact will be negligible.

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

The ESHWG considers that the fast track harmonisation process is appropriate for this rule.

H 3

ANM-00-377-A

ARAC ESHWG REPORT AMJ 25.1309(b)
[new § 25.1365]

See ANM-00-087-A Elec. Sys and TPE

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

JAR specific AMJ 25.1309(b) was introduced to cover two basic issues:

(a) Faulty galley heating equipment has been the cause of many incidents which have resulted in smoke or fire in the cabin and of incidents involving injuries to cabin crew, etc. Improvements in the safety of aircraft domestic equipment design and installations should reduce the probability of such incidents and improve safety standards.

(b) Recorded incidents have shown that the circuit protection devices used in motor power supplies, particularly those used in domestic systems, have not always provided adequate protection against failures which cause a motor overheat condition.

The advisory material provided in AMJ 25.1309(b) gives guidance on some acceptable methods of reducing the probability of failures which could cause airworthiness hazards.

2 - What are the current FAR and JAR standards?

Current FAR and JAR texts for 25.1309 are identical, but JAR 25.1309(b) makes reference to AMJ 25.1309(b).

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

FAR does not provide standards for domestic services and appliances.

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

JAA has a specific AMJ. There is no equivalent published FAA Advisory Material on the subject, apart from AC 25-10, which is less specific.

AMJ 25.1309(b)

Equipment Systems and Installations

See JAR 25.1309(b)

1. Heated Domestic Appliances (Galley Equipment)

1.1 The design and installation of heated domestic appliances should be such that no single failure (e.g. welded thermostat or contactor) can result in dangerous uncontrolled heating and consequent risk of fire or smoke or injury to occupants. An acceptable method of achieving this is by the provision of a means independent of the normal temperature control system, which will automatically interrupt the electrical

power supply to the unit in the event of an overheat condition occurring. The means adopted should be such that it cannot be reset in flight.
1.2 The design and installation of microwave ovens should be such that no hazard could be caused to the occupants or the equipment of the aeroplane under either normal operation or single failure conditions.
1.3 Heated liquid containers, e.g. water boilers, coffee makers should, in addition to overheat protection, be provided with an effective means to relieve over pressure, either in the equipment itself or in its installations.
NOTE: Due account should be taken of the possible effects of lime scale deposit both in the design and maintenance procedures of water heating equipment.

2. Electric Overheat Protection Equipment, Including those Installed in Domestic Systems
2.1 Unless it can be shown that compliance with JAR 25.1309(b) is provided by the circuit protective device required by JAR 25.1357(a), electric motors and transformers etc. (including those installed in domestic systems, such as galleys and toilet flush systems) should be provided with a suitable thermal protection device if necessary to prevent them overheating such as to create a smoke or fire hazard under normal operation and failure conditions.
The following should be taken into consideration:

a. Failures of any automatic control systems, e.g. automatic timer systems, which may cause the motor to run continuously;
b. Short circuit failures of motor windings or transformer windings to each other or to the motor or transformer frame;
c. Open circuit of one or more phases on multi-phase motors;
d. Motor seizures;
e. The proximity of flammable materials or fluids;
f. The proximity of other aeroplane installations;
g. Spillage of fluids, such as toilet waste;
h. Accumulation of combustible material; and
i. Cooling air discharge under normal operating or failure conditions.

5 - What is the proposed action?

According to the better plan for harmonisation, FAR/JAR 25.1309(b) is to be enveloped to the most stringent requirement. As there is no direct equivalent FAA AC text, the initial plan was to adopt AMJ 25.1309(b) as FAA advisory material.

The ESHWG position is that the AMJ 25.1309(b) is not the best place to add substantial material that is specific for domestic services and appliances only, since this could give the suggestion that 25.1309(b) is not applicable to other systems.

Furthermore it is proposed to have a lead in paragraph specific to domestic appliances which would contain the parts of the AMJ that are more appropriate to a rule text (see also 12), and also contain some parts of **JAR25X799 and** JAR 25X1499 that are relevant to the subject.

To accomplish this, the proposal is to:

- Introduce a new FAR/JAR 25.1365 within the "Miscellaneous Equipment" section of subpart F, that is specific to domestic appliances.

- Introduce a new AC/ACJ 25.1365 that is based on existing AMJ 25.1309(b) and ACJs to 25X799 and 25X1499, but with those elements that have been transferred to the rule removed.

- Delete existing AMJ 25.1309(b).

- See also 18 below

6 - What should the harmonized standard be?

FAR/JAR 25.1365 Electrical appliances, motors and transformers

(see ACJ 25.1365 - JAR only)

Note : FAR will not make reference to AC or ACJ in rule text

(a) Domestic appliances must be so designed and installed that in the event of failures of the electrical supply or control system, the requirements of FAR/JAR 25.1309 (b), (c) and (d) will be satisfied.

(b) The installation of galleys and cooking appliances must be such as to minimise the risk of overheat or fire.

(c) Domestic appliances, particularly those in galley areas, must be so installed or protected as to prevent damage or contamination of other equipment or systems from fluids or vapours which may be present during normal operation or as a result of spillage, where such damage or contamination may hazard the aeroplane.

(d) Unless it can be shown that compliance with FAR/JAR 25.1309(b) is provided by the circuit protective device required by FAR/JAR 25.1357(a), electric motors and transformers etc. (including those installed in domestic systems, such as galleys and toilet flush systems) must be provided with a suitable thermal protection device if necessary to prevent them overheating such as to create a smoke or fire hazard under normal operation and failure conditions.

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

The now proposed standard contains material that was introduced in JAR 25 by NPA 25DF-191. At first as NPA and since the introduction in JAR-25 as basic JAR code the material was used in aircraft certification programs since 1987 and has improved the safety of domestic appliances significantly. (for instance by the introduction of an overheat protection independent from the normal temperature regulation of heating galley equipment).

The proposal can be considered as an improvement of current practices and adoption of existing JAA text to cover the underlying safety issue.

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

The proposed standard increases the level of safety.

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

The proposed standard increases the level of safety.

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

No other options have been considered.

11 - Who would be affected by the proposed change?

Aircraft Operators and Manufacturers together with galley equipment and electrical equipment suppliers could be affected by this change.

Since new certificated aircraft have to be supplied with new standard galley equipment, airplane operators may elect to introduce the same new equipment on their old fleet for reason of fleet commonality.

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

Parts of AMJ 25.1309(b) that are more pertinent to a rule text have been moved to a new FAR/JAR 25.1365 paragraph specific to domestic appliances.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

There is no equivalent published FAA Advisory Material on the subject, apart from AC 25-10, that applies to non-required electrical equipment only. It is recommended that a

revised AMJ 25.1309(b) be adopted for FAR/JAR 25 for compliance with the new FAR/JAR 25.1365.

AC/ACJ 25.1365

Electrical appliances, motors and transformers
See FAR/JAR 25.1365

1. Heated Domestic Appliances (Galley Equipment)

In showing compliance with FAR/JAR 25.1365(a), the following should be taken into consideration:
1.1 The design and installation of heated domestic appliances should be such that no single failure (e.g. welded thermostat or contactor, loss of water supply) can result in dangerous overheating and consequent risk of fire or smoke or injury to occupants.

An acceptable method of achieving this is by the provision of a means independent of the normal temperature control system, which will automatically interrupt the electrical power supply to the unit in the event of an overheat condition occurring. The means adopted should be such that it cannot be reset in flight.

1.2 The design and installation of microwave ovens should be such that no hazard could be caused to the occupants or the equipment of the aeroplane under either normal operation or single failure conditions.

1.3 Heated liquid containers, e.g. water boilers, coffee makers should, in addition to overheat protection, be provided with an effective means to relieve overpressure, either in the equipment itself or in its installations.

NOTES:

Due account should be taken of the possible effects of lime scale deposit both in the design and maintenance procedures of water heating equipment.

The design of galley and cooking appliance installations should be such as to facilitate cleaning to limit the accumulation of extraneous substances which may constitute a fire risk.

2. Electric Overheat Protection Equipment

In showing compliance with FAR/JAR 25.1365(d), the following should be taken into consideration:

a. Failures of any automatic control systems, e.g. automatic timer systems, which may cause the motor to run continuously;
b. Short circuit failures of motor windings or transformer windings to each other or to the motor or transformer frame;
c. Open circuit of one or more phases on multi-phase motors;
d. Motor seizures;
e. The proximity of flammable materials or fluids;
f. The proximity of other aeroplane installations;
g. Spillage of fluids, such as toilet waste;
h. Accumulation of combustible material; and
i. Cooling air discharge under normal operating or failure conditions.

3. Water systems

3.1 Where water is provided in the aeroplane for consumption or use by the occupant, the associated system should be designed so as to ensure that no hazard to the aeroplane can result from water coming into contact with electrical or other systems.

3.2 Service connections (filling points) should be of a different type from those used for other services, such that water could not inadvertently be introduced into the systems for other services.

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

There is no equivalent ICAO standard.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

The cost is likely to increase slightly to those manufacturers who currently certify only to FAR 25 requirements. Since compliance with this proposed standard is considered a good design practice, any cost increase will be due to additional documentation, testing and analysis. These would be offset by having to comply with a single harmonized standard.

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

The ESHWG considers that the Category 1 fast track harmonization process is appropriate for this rule.

#3

ANM-00-263-A
TAE
Elec. Systems
see-ANM-00-082

ARAC ESHWG REPORT 25.1431(d)

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

JAR specifies requirements relating to the design and installation of electronic equipment such that these may not cause essential loads to malfunction. There is no equivalent FAR.

2 - What are the current FAR and JAR standards?

Current FAR text:

There is no current FAR rules text.

Current JAR text:

JAR 25.1431 Electronic Equipment

(d) Electronic equipment must be designed and installed such that it does not cause essential loads to become inoperative, as a result of electrical power supply transients or transients from other causes.

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

There is no equivalent FAR. JAR requires additional verification that any electronic equipment will not cause essential loads to become inoperative as a result of electrical power supply transients or transients from other causes.

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

Since there are no equivalent FAR standards, additional verification is required by JAR that electronic equipment will not cause essential loads to become inoperative as a result of electrical power supply transients or transients from other causes.

5 – What is the proposed action?

The proposed action is to adopt JAR 25.1431(d).

6 - What should the harmonized standard be?

FAR/JAR 25.1431 Electronic Equipment

(d) Electronic equipment must be designed and installed such that it does not cause essential loads to become inoperative, as a result of electrical power supply transients or transients from other causes.

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

The proposed standard addresses the need for installed electronic equipment to be designed and installed such that essential loads (as defined in JAR25.1309(e)) will not become inoperative as a result of electrical power supply transients or transients from other causes.

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

Since this proposal is in line with current industry practices, and it is already included by implication in Sections 25.1309(e), 25.1351(b) and 25.1353(a) it will maintain the same level of safety.

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

Since this proposal is in line with current industry practices, and it is already included by implication in Sections 25.1309(e), 25.1351(b) and 25.1353(a), it will maintain the same level of safety.

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

Not to adopt the JAR requirements was considered however for the reasons as stated above the group decided to adopt the more specific requirement in accordance with fast track harmonization process.

11 - Who would be affected by the proposed change?

As the proposal is in line with current design practices, the effect is considered to be minimum for aircraft operators and manufacturers affected by this change.

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

None.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

There is no current published FAA Advisory Material.

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

As the proposal is in line with current design practices the cost impact will be negligible.

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

The ESHWG considers that the fast track harmonization process is appropriate for this rule.

ANM-00-226-A #3

see ANM-00-087-A NPRM pub 1/24/02

ARAC WG Report

Report from the Flight Test Harmonization Working Group

Rule Section: FAR/JAR 25.111(c)(4)

What is the underlying safety issue addressed by the FAR/JAR?: This requirement sets forth the definition of the takeoff path, which is used to comply with certain airworthiness and operating limitations. Section/JAR 25.111(c)(4), which is the only paragraph that is different between the FAR and JAR, allows only certain routine crew actions to be made before the airplane reaches a height of 400 feet above the takeoff surface. Simulation studies and accident investigations have shown that during periods of high workload, as with an engine failure during takeoff, the crew might not take actions such as advancing the power levers on the operating engine(s), even if the crew knows that the operating engine(s) are not at their maximum power setting. Credit can be taken for retracting the landing gear, however, as this is accomplished routinely once a positive rate of climb is observed.

What are the current FAR and JAR standards?: see below

> Current FAR text: § 25.111(c)(4): Except for gear retraction and propeller feathering, the airplane configuration may not be changed, and no change in power or thrust that requires action by the pilot may be made, until the airplane is 400 feet above the takeoff surface.
>
> Current JAR text: JAR 25.111(c)(4): Except for gear retraction and automatic propeller feathering, the aeroplane configuration may not be changed, and no change in power or thrust that requires action by the pilot may be made, until the aeroplane is 400 feet above the takeoff surface.

What are the differences in the standards and what do these differences result in?: The standards are the same except for §/JAR 25.111(c)(4). Although both standards allow credit in §/JAR 25.111(c)(4) for propeller feathering before the airplane is 400 feet above the takeoff surface, the JAR standard explicitly limits this credit to **automatic** propeller feathering. The JAR standard does not allow credit for manual propeller feathering until the airplane is at least 400 feet above the takeoff surface.

FAA policy has been in accordance with the JAR standard. Only automatic propeller feathering has been accepted as complying with the intent of § 25.111(c)(4).

RPR # ANM-00-226-A

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

The means of compliance are the same, except for the following 2 JAA ACJ's.

ACJ 25.111
The height references in JAR 25.111 should be interpreted as geometrical heights.

ACJ 25.111(b):

2 The time between lift-off and the initiation of gear retraction should be not less than 3 seconds and may need to be longer than 3 seconds if, on a particular aeroplane type, a longer delay is found to be appropriate.

There is no FAA equivalent to ACJ 25.111. The FAA equivalent to ACJ 25.111(b) No. 2

is paragraph 12e(2) of AC 25-7A:

(2) Procedures. The time between liftoff and initiation of gear retraction should not be less than that necessary to establish an indicated positive rate of climb plus one second.

What is the proposed action?: Codify current FAA policy by harmonizing to the JAR standard.

What should the harmonized standard be?: see below

Proposed text of harmonized standard:

FAR/JAR 25.111(c)(4): Except for gear retraction and automatic propeller feathering, the airplane configuration may not be changed, and no change in power or thrust that requires action by the pilot may be made, until the airplane is 400 feet above the takeoff surface.

How does this proposed standard address the underlying safety issue?: It continues to address the underlying safety issue in the same manner by codifying current FAA policy to harmonize with the JAR.

Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety?: Maintain. In AC 25-7A, it is noted that propeller feathering before the airplane reaches a height of 400 feet must be automatic in order to receive credit for its effect on the flight path.

Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety?: Maintain.

RPR # ANM-00-226-A

What other options have been considered and why were they not selected?: This item was proposed as an enveloping item. No other options were considered.

Who would be affected by the proposed change?: Manufacturers and operators of transport category airplanes could be affected by the proposed change; however, there will be no effect as it codifies current practices and policy.

To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?: None.

Is existing FAA advisory material adequate? (If not, what advisory material should be adopted?): Revise AC 25-7A as follows:

Add a new paragraph 12a(1)(iii) to read as follows:

(iii) The height references in § 25.111 should be interpreted as geometrical heights.

Revise paragraph 12e(2) to read as follows:

(2) Procedures. The time between liftoff and the initiation of gear retraction during takeoff distance demonstrations should not be less than that necessary to establish an indicated positive rate of climb plus one second. For the purposes of flight manual expansion, the average demonstrated time delay between liftoff and initiation of gear retraction may be assumed; however, this value should not be less than 3 seconds.

How does the proposed standard compare to the current ICAO standards?: The proposed standard is consistent with the ICAO standards, which are not specific in this area.

Does the proposed standard affect other harmonization working groups?: No.

What is the cost impact of complying with the proposed standard?: None.

Does the working group want to review the draft NPRM prior to publication in the Federal Register?: Yes.

In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain: Yes, the "Fast Track" process is appropriate for this project. The project is neither too complex nor too controversial to use the "Fast Track" process.

RPR # ANM-00-226-A

ARAC WG Report

Report from the Flight Test Harmonization Working Group

Rule Section: FAR/JAR 25.147(c)(2)

What is the underlying safety issue addressed by the FAR/JAR?: This requirement is part of FAR/JAR 25.147(c), which addresses controllability in the one-engine-inoperative-condition. It requires that transport category airplanes be controllable and maneuverable with the critical engine inoperative.

What are the current FAR and JAR standards?: see below

Current FAR text: none

> Current JAR text: With the critical engine inoperative, roll response must allow normal manoeuvres. Lateral control must be sufficient, at the speeds likely to be used with one engine inoperative for climb, cruise, descent and landing approach, to provide a peak roll rate necessary for safety without excessive control forces or travel. (See ACJ 25.147(c)(2).)

What are the differences in the standards and what do these differences result in?: In addition to the minimum bank angle capability at 1.4 V_S prescribed by FAR/JAR 25.147(c), JAR 25.147(c)(2) addresses roll rate. Roll rate response must be evaluated and found adequate for all speeds likely to be used with one engine inoperative for climb, cruise, descent, and landing approach. Also, control forces and control travel must not be excessive.

Additional flight testing is needed to show compliance with the JAR requirement. Since industry practice is to comply with both standards, it is difficult determine whether there are any resulting design differences. It is not known if the differences in the standards would have resulted in any design differences had current industry practice not been to comply with both standards.

What, if any, are the differences in the means of compliance?: The FAR does not prescribe any roll rate requirements. Any evaluation of roll rate would be only of a general qualitative nature relative to the ease of performing the banked turns required by § 25.147(c). Also, the FAR evaluation is only performed at 1.4 V_S. Control forces for the 20 degree banked turn maneuver of § 25.147(c) would be subject to the requirements of § 25.143(c).

The JAR means of compliance is given by ACJ 25.147(c)(2):

JAR ACJ 25.147(c)(2) Lateral Control: One Engine Inoperative (Interpretative Material)

An acceptable method of demonstrating compliance with JAR 25.147(c)(2) is as follows:

It should be possible in the conditions specified below to roll the aeroplane from a steady 30° banked turn through an angle of 60° so as to reverse the direction of the turn in not more than 11 seconds. In this demonstration the rudder may be used to the extent necessary to minimise sideslip. The demonstration should be made rolling the aeroplane in either direction, and the manoeuvre may be unchecked.

Conditions: Airspeed V_2
Wing-flaps. In each take-off position.
Landing Gear. Retracted.
Power. The critical engine inoperative and its propeller (if applicable) in the minimum drag condition; the remaining engines operating at maximum take-off power.
Trim. The aeroplane should be in trim, or as nearly as possible in trim, for straight flight in these conditions, and the trimming controls should not be moved during the manoeuvre.

What is the proposed action?: The proposed action is to harmonize the requirements by adding the additional JAR requirement to the FAR. The word "peak" would be removed under this proposal in reference to the roll rate that must be available. The FTHWG considers the use of the work "peak" to be too constraining and unclear. For example, would demonstrating an average roll rate capability be acceptable for showing compliance with a requirement for a peak roll rate? And is a peak roll rate the maximum sustainable roll rate, or a short transient condition that results from unique or unusual piloting techniques?

The words, "for climb, cruise, descent, and landing approach" would also be removed. This requirement would apply to all flight conditions, so there is no need to list them individually. The flight conditions listed in the existing JAR requirement do not include takeoff, yet it is apparent that the takeoff condition is to be considered, since the means of compliance given in the JAR guidance material are for the takeoff condition.

What should the harmonized standard be?: see below

Proposed text of harmonized standard:

FAR/JAR 25.147(d): *Lateral control; roll capability.* With the critical engine inoperative, roll response must allow normal maneuvers. Lateral control must be sufficient, at the speeds likely to be used with one engine inoperative, to provide a roll rate necessary for safety without excessive control forces or travel.

How does this proposed standard address the underlying safety issue?: It harmonizes the FAR and JAR by adding the JAR requirement to the FAR. The FAR would then

prescribe roll rate requirements in the same manner as the current JAR.

Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain: It increases the level of safety because it adds a requirement that is not currently in the FAR.

Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain: It maintains the same level of safety since current industry practice is to comply with both standards.

What other options have been considered and why were they not selected?: This item was proposed as an enveloping item. No other options were considered.

Who would be affected by the proposed change?: Manufacturers of transport category airplanes would be affected by the rule change.

To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?: None. Although very specific guidance is provided in the current ACJ for demonstrating compliance with the rule, it only represents one acceptable means of compliance. There may be other means of demonstrating compliance with the requirement. This point will be emphasized in the proposed revisions to this guidance material.

Is existing FAA advisory material adequate? (If not, what advisory material should be adopted?): The existing JAA ACJ is adequate, but will need to be reformatted for inclusion into FAA AC 25-7A. Also, there is a concern the way that maximum takeoff weight and most aft c.g. position are stated separately in the test procedures paragraph. The concern is that it could be interpreted to mean that both the maximum takeoff weight and the most aft c.g. positions must be demonstrated if these parameters do not coincide. It is intended that the most critical condition of maximum takeoff weight and aft c.g. position be demonstrated. The FTHWG did not propose changing the wording, however, in order to maintain consistency with the guidance material for the rest of § 25.147. Instead, the FTHWG recommends that the FAA adopt consistent wording for the weight and c.g. conditions called out in the guidance material for each of the §§ 25.145 and 25.147 requirements. The FTHWG recommends that wording similar to "Most critical combination of [takeoff, landing, as applicable] weight and c.g. position" be used.

Proposed advisory material: (AC 25-7A)

22. DIRECTIONAL AND LATERAL CONTROL - § 25.147.

    a. Explanation.

        (1) .....

(2) Sections 25.147(c) and (e) require an airplane to be easily controllable with the critical engine(s) inoperative. Section 25.147(d) further requires that an adequate roll rate be provided, without excessive control forces or travel, at the speeds likely to be used with one engine inoperative. Compliance with § 25.147(d) can normally be demonstrated in the takeoff configuration at V_2 speed, because this is the one-engine-inoperative condition that is usually the most critical from a roll rate standpoint. Normal operation of a yaw stability augmentation system (SAS) should be considered in accordance with normal operating procedures. Roll response with all engines operating, § 25.147(e), should be satisfactory for takeoff, approach, landing, and high speed configurations. Any permissible configuration that could affect roll response should be evaluated.

b. Procedures. The following test procedures outline an acceptable means for demonstrating compliance with § 25.147.

(1) Directional Control - General, § 25.147(a).

.....

(2) Directional Control - Four or More Engines, § 25.147(b).

.....

(3) Lateral Control - General, § 25.147(c).

(i) Configuration:

(A) Maximum takeoff weight.

(B) Most aft c.g. position.

(C) Wing flaps in the most favorable climb position.

(D) Landing gear retracted and extended.

(E) Yaw SAS on, and off if applicable.

(F) Operating engine(s) at maximum continuous power.

(G) The inoperative engine that would be most critical for controllability, with the propeller feathered, if applicable.

(ii) Test Procedure: With the airplane trimmed at 1.4 V_S, turns with a bank

angle of 20 degrees should be demonstrated with and against the inoperative engine from a steady climb at 1.4 V_{S1}. It should not take exceptional piloting skill to make smooth, predictable turns.

(4) Lateral Control – Roll Capability, § 25.147(d).

(i) Configuration:

(A) Maximum takeoff weight.

(B) Most aft c.g. position.

(C) Wing flaps in the most critical take-off position.

(D) Landing gear retracted.

(E) Yaw SAS on, and off, if applicable.

(F) Operating engine(s) at maximum take-off power.

(G) The inoperative engine that would be most critical for controllability, with the propeller feathered, if applicable.

(ii) Test Procedure: With the airplane in trim, or as nearly as possible in trim, for straight flight at V_2, establish a steady 30° banked turn. It should be demonstrated that the airplane can be rolled to a 30° bank angle in the other direction in not more than 11 seconds. In this demonstration, the rudder may be used to the extent necessary to minimize sideslip. The demonstration should be made in the most adverse direction. The maneuver may be unchecked. Care should be taken to prevent excessive sideslip and bank angle during the recovery.

(54) Lateral Control - Four or More Engines, § 25.147(d).

.....

(65) Lateral Control - All Engines Operating, § 25.147(e).

.....

How does the proposed standard compare to the current ICAO standards?: The ICAO standards are very general in this area such that neither adoption nor rejection of the proposed standard will have any affect on compliance with the ICAO standards.

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Does the proposed standard affect other harmonization working groups?: No.

What is the cost impact of complying with the proposed standard?: The cost of complying is negligible for the following reasons. For applicants already conducting JAA certifications, there are no additional costs. For other applicants, additional costs of compliance are possible (less than ½ hour of flight testing and 20 hours of data analysis).

Does the working group want to review the draft NPRM prior to publication in the Federal Register?: Yes

In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain: Yes, the "Fast Track" process is appropriate for this project. The project is neither too complex nor too controversial to use the "Fast Track" process.

RPR # ANM-00-226-A

ARAC WG Report

Report from the Flight Test Harmonization Working Group

Rule Section: FAR/JAR 25.161(c)(2)

What is the underlying safety issue addressed by the FAR/JAR?: Section/JAR 25.161 requires that transport category airplanes maintain longitudinal, lateral, and directional trim under certain conditions of flight. The capability to trim out control forces is both a pilot workload and a flight path precision issue. An out-of-trim airplane can be fatiguing to fly and it is more difficult to maintain the desired flight path.

Section/JAR 25.161(c)(2) specifies conditions under which longitudinal trim must be maintained.

What are the current FAR and JAR standards?: see below

> Current FAR text: Section 25.161(c)(2): A glide with power off at a speed not more than 1.4 V_{S1}, with the landing gear extended, the wing flaps (i) retracted and (ii) extended, the most unfavorable center of gravity position approved for landing with the maximum landing weight, and with the most unfavorable center of gravity position approved for landing regardless of weight; and
>
> Current JAR text: JAR 25.161(c)(2): Either a glide with power off at a speed not more than 1.4 V_{S1}, or an approach within the normal range of approach speeds appropriate to the weight and configuration with power settings corresponding to a 3° glidepath, whichever is the most severe, with the landing gear extended, the wing flaps (i) retracted and (ii) extended, the most unfavourable centre of gravity position approved for landing with the maximum landing weight, and with the most unfavourable centre of gravity position approved for landing regardless of weight; and

What are the differences in the standards and what do these differences result in?: In addition to the power-off glide condition specified by the FAR, the JAR requires longitudinal trim to be maintained at speeds and power settings appropriate to an approach on a 3 degree glidepath. For airplanes where this condition is more stringent than the power-off glide condition, a design difference may result. Also, additional flight testing must be performed to demonstrate compliance.

What, if any, are the differences in the means of compliance?: Except for the means of compliance associated with the differences in the standards, the means of compliance are the same.

What is the proposed action?: Harmonize to the more stringent JAR standard. The

phrase, "the most unfavourable centre of gravity position approved for landing with the maximum landing weight" has been removed. This phrase is unnecessary because compliance must also be demonstrated at the "most unfavorable center of gravity position approved for landing regardless of weight." The original CAR 4b rule referenced "the most forward" center of gravity position in each instance, so it is conceivable that the first case could have been more critical at that time.

What should the harmonized standard be?: see below

Proposed text of harmonized standard:

FAR/JAR 25.161(c)(2): Either a glide with power off at a speed not more than 1.4 V_{S1}, or an approach within the normal range of approach speeds appropriate to the weight and configuration with power settings corresponding to a 3° glidepath, whichever is the most severe, with the landing gear extended, the wing flaps (i) retracted and (ii) extended, and with the most unfavorable center of gravity position approved for landing regardless of weight; and

How does this proposed standard address the underlying safety issue?: It continues to address the underlying safety issue in the same manner, but adds a requirement to ensure that transport category airplanes maintain longitudinal trim in a power-on approach condition.

Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety?: It increases the level of safety for those transport category airplanes for which the power-on approach condition is more critical for maintaining longitudinal trim than the power-off glide condition.

Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety?: It maintains the current level of safety since industry practice is to comply with both the FAR and the JAR.

What other options have been considered and why were they not selected?: This item was proposed as an enveloping item. No other options were considered.

Who would be affected by the proposed change?: Manufacturers and operators of transport category airplanes could be affected by the proposed change.

To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?: None.

Is existing FAA advisory material adequate? (If not, what advisory material should be adopted?): There is no specific advisory material for either the JAR or the FAR, so there is not a harmonization issue. Developing new harmonized advisory material appears to be unnecessary and probably would not fit within the fast track schedule.

RPR # ANM-00-226-A

How does the proposed standard compare to the current ICAO standards?: The proposed standards are consistent with, but more detailed than the ICAO standards.

Does the proposed standard affect other harmonization working groups?: No.

What is the cost impact of complying with the proposed standard?: The cost of complying is negligible for the following reasons. For applicants already conducting JAA certifications, there are no additional costs. For other applicants, additional costs of compliance are possible (less than ½ hour of flight testing and 20 hours of data analysis).

Does the working group want to review the draft NPRM prior to publication in the Federal Register?: Yes.

In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain: Yes, the "Fast Track" process is appropriate for this project. The project is neither too complex nor too controversial to use the "Fast Track" process.

RPR # ANM-00-226-A

ARAC WG Report

Report from the Flight Test Harmonization Working Group

Rule Section: FAR/JAR 25.175(d)

What is the underlying safety issue addressed by the FAR/JAR?: Section/JAR 25.175 contains the conditions under which static longitudinal stability must be demonstrated for transport category airplanes. Static longitudinal stability is required by part 25 for the following reasons:

- Provides additional speed change cues to the pilot through control force changes.
- Ensures that short periods of unattended operation do not result in any significant changes in attitude, airspeed, or load factor.
- Provides predictable pitch response.
- Provides acceptable level of pilot attention (workload) to attain and maintain trim speed and altitude.
- Provides gust stability.

What are the current FAR and JAR standards?: see below

Current FAR text: *Landing.* The stick force curve must have a stable slope, and the stick force may not exceed 80 pounds, at speeds between 1.1 V_{S0} and 1.8 V_{S0} with--

(1) Wing flaps in the landing position;
(2) Landing gear extended;
(3) Maximum landing weight;
(4) Power or thrust off on the engines; and
(5) The airplane trimmed at 1.4 V_{S0} with power or thrust off.

Current JAR text: *Landing.* The stick force curve must have a stable slope, and the stick force may not exceed 80 pounds, at speeds between 1.1 V_{S0} and 1.8 V_{S0} with--

(1) Wing flaps in the landing position;
(2) Landing gear extended;
(3) Maximum landing weight;
(4) The aeroplane trimmed at 1.4 V_{S0} with –
  (i) Power or thrust off, and
  (ii) Power or thrust for level flight.

What are the differences in the standards and what do these differences result in?: The JAR standard requires the stick force criteria to be met at the power or thrust for level flight in addition to the FAR condition of power or thrust off. This additional condition

requires additional flight test demonstrations to show compliance and may have an influence on the design of airplanes for which the application of power has a significant destabilizing effect.

What, if any, are the differences in the means of compliance?: Except for the additional power-on condition required by the JAR, there are no differences in the means of compliance.

What is the proposed action?: Harmonize to the more stringent JAR standard.

What should the harmonized standard be?: see below

Proposed text of harmonized standard:

FAR/JAR 25.175(d): *Landing.* The stick force curve must have a stable slope, and the stick force may not exceed 80 pounds, at speeds between 1.1 V_{S0} and 1.8 V_{S0} with--

(1) Wing flaps in the landing position;
(2) Landing gear extended;
(3) Maximum landing weight;
(4) The airplane trimmed at 1.4 V_{S0} with –
  (i) Power or thrust off, and
  (ii) Power or thrust for level flight.

How does this proposed standard address the underlying safety issue?: It continues to address the underlying safety issue in the same manner, but adds a requirement to ensure that transport category airplanes have adequate static longitudinal stability in a power-on approach condition.

Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety?: It increases the level of safety for those transport category airplanes for which the power-on condition is more critical in terms of static longitudinal stability than the power-off condition.

Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety?: It maintains the current level of safety since industry practice is to comply with both the FAR and the JAR.

What other options have been considered and why were they not selected?: Harmonizing to the FAR standard was considered; however, there are normally occurring situations for which level flight in the landing configuration may be relevant. These situations include stepdown fixes on nonprecision approaches and extending the flaps and landing gear to the landing configuration when the glide slope becomes active on a precision approach, but before the glide slope intercept point.

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Who would be affected by the proposed change?: Manufacturers and operators of transport category airplanes could be affected by the proposed change.

To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?: None.

Is existing FAA advisory material adequate? (If not, what advisory material should be adopted?): The existing advisory material is adequate.

How does the proposed standard compare to the current ICAO standards?: The proposed standards are consistent with, but more detailed than the ICAO standards.

Does the proposed standard affect other harmonization working groups?: No.

What is the cost impact of complying with the proposed standard?: The cost of complying is negligible for the following reasons. For applicants already conducting JAA certifications, there are no additional costs. For other applicants, additional costs of compliance are possible (less than ½ hour of flight testing and 20 hours of data analysis).

Does the working group want to review the draft NPRM prior to publication in the Federal Register?: Yes.

In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain: Yes, the "Fast Track" process is appropriate for this project. The project is neither too complex nor too controversial to use the "Fast Track" process.

ANM-00-234A

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ARAC Electrical Systems Harmonization Working Group
Final ARAC ESHWG REPORT 25.869(a)

30 November 1999

OLD # ANM-00-087-A TAE

1 - What is underlying safety issue addressed by the FAR/JAR? *[Explain the underlying safety rationale for the requirement. Why does the requirement exist?]*

FAR/JAR 25.869(a) address fire protection of electrical system components and provide specific standards to be met depending on location and type of cables.

2 - What are the current FAR and JAR standards? *[Reproduce the FAR and JAR rules text as indicated below.]*

Current FAR text:

Sec. 25.869 Fire protection: systems.

(a) Electrical system components:

(1) Components of the electrical system must meet the applicable fire and smoke protection requirements of Secs. 25.831(c) and 25.863.

(2) Electrical cables, terminals, and equipment in designated fire zones, that are used during emergency procedures, must be at least fire resistant.

(3) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must be--

(i) Isolated from flammable fluid lines; or

(ii) Shrouded by means of electrically insulated, flexible conduit, or equivalent, which is in addition to the normal cable insulation.

(4) Insulation on electrical wire and electrical cable installed in any area of the fuselage must be self-extinguishing when tested in accordance with the applicable portions of part I, appendix F of this part.

Current JAR text:

JAR 25.869 Fire protection: systems

(a) Electrical system components:

(1) Components of the electrical system must meet the applicable fire and smoke protection requirements of JAR 25.831(c) and JAR 25.863. (See ACJ 25.869 (a)(1).)

(2) Electrical cables, terminals, and equipment in designated fire zones, that are used during emergency procedures, must be at least fire resistant.

(3) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must be -
   (i) Isolated from flammable fluid lines; or
   (ii) Shrouded by means of electrically insulated, flexible conduit, or equivalent, which is in addition to the normal cable insulation.

(4) Insulation on electrical wire and electrical cable installed in any area of the aeroplane must be self-extinguishing when tested in accordance with the applicable portions of Part I, Appendix F.

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

[Explain the differences in the standards, and what these differences result in relative to (as applicable) design features/capability, safety margins, cost, stringency, etc.]

The regulatory difference is within 25.869(a)(4) where JAR refers to "aeroplane" and FAR refers to "fuselage". The technical need and accepted industry practice and Regulatory Authority application is that all wiring installed in the airframe and engines, (i.e., not just those in the fuselage), is self extinguishing. The JAR text introduced by NPA 25DF-191 is such that the requirement reflects this standard.

4 - What, if any, are the differences in the means of compliance? *[Provide a brief explanation of any differences in the compliance criteria or methodology, including any differences in either criteria, methodology, or application that result in a difference in stringency between the standards.]*

JAR has a specific ACJ related to 25.869(a)(1):

ACJ 25.869: Electrical System Fire and Smoke Protection (Interpretative Material and Acceptable Means of Compliance)
See JAR 25.869

These requirements, and those of JAR 25.863 applicable to electrical equipment, may be satisfied by the following:

1 Electrical components in regions immediately behind firewalls and in engine pod attachment structures should be of such materials and at such a distance from the firewall that they will not suffer damage that could hazard the aeroplane if the surface of the firewall adjacent to the fire is heated to 1100°C for 15 minutes.

2 Electrical equipment should be so constructed and/or installed that in the event of failure, no hazardous quantities of toxic or noxious (e.g. smoke) products will be distributed in the crew or passenger compartments.

3 Electrical equipment, which may come into contact with flammable vapours should be so designed and installed as to minimise the risk of the vapours exploding under both normal and fault conditions. This can be satisfied by meeting the Explosion Proofness Standards of draft ISO document TC20/SC5/N.43, dated 1974.

5 - What is the proposed action? *[Is the proposed action to harmonize on one of the two standards, a mixture of the two standards, propose a new standard, or to take some other action? Explain what action is being proposed (not the regulatory text, but the underlying rationale) and why that direction was chosen.]*

According to the Better Plan for Harmonization, FAR/JAR 25.869(a) is to be enveloped to the "most stringent" requirement, which is JAR 25.869(a). This is also in line with current design practices.

6 - What should the harmonized standard be? *[Insert the proposed text of the harmonized standard here]*

The current text of JAR 25.869(a) *[see above]* is proposed as the harmonized standard.

7 - How does this proposed standard address the underlying safety issue (identified under #1)? *[Explain how the proposed standard ensures that the underlying safety issue is taken care of.]*

The proposal can be considered as a clarification of existing requirements and in line with current practices.

8 - Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain. *[Explain how each element of the proposed change to the standards affects the level of safety relative to the current FAR. It is possible that some portions of the proposal may reduce the level of safety even though the proposal as a whole may increase the level of safety.]*

The proposed standard increases the level of safety because JAR refers to aeroplane while the FAR refers to fuselage only.

9 - Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain. *[Since industry practice may be different than what is required by the FAR (e.g., general industry practice may be more restrictive), explain how each element of the proposed change to the standards affects the level of safety relative to current industry practice. Explain whether current industry practice is in compliance with the proposed standard.]*

This proposal is in line with current industry practices and therefore maintains the same level of safety.

10 - What other options have been considered and why were they not selected? *[Explain what other options were considered, and why they were not selected (e.g., cost/benefit, unacceptable decrease in the level of safety, lack of consensus, etc.]*

The adoption of FAR was considered; however, for the reasons as stated above JAR was selected.

11 - Who would be affected by the proposed change? *[Identify the parties that would be materially affected by the rule change – airplane manufacturers, airplane operators, etc.]*

As the proposal is in line with current design practices, the effect is considered to be minimum for Aircraft Operators and Manufacturers affected by this change.

12 - To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble? *[Does the existing advisory material include substantive requirements that should be contained in the regulation? This may occur because the regulation itself is vague, or if the advisory material is interpreted as providing the only acceptable means of compliance.]*

No current advisory material is proposed to be included in the rule.

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted? *[Indicate whether the existing advisory material (if any) is adequate. If the current advisory material is not adequate, indicate whether the existing material should be revised, or new material provided. Also, either insert the text of the proposed advisory material here, or summarize the information it will contain, and indicate what form it will be in (e.g., Advisory Circular, policy, Order, etc.)]*

There is no current published FAA advisory material. It is recommended that the JAR ACJ to 25.869(a)(1) be adopted in FAA advisory material with modification of reference to draft ISO document TC20/SC5/N.43, dated 1974 by reference to RTCA DO-160/EUROCAE ED-14 which is the up to date document; so that it reads:

ACJ 25.869: Electrical System Fire and Smoke Protection (Interpretative Material and Acceptable Means of Compliance)
See JAR 25.869

These requirements, and those of JAR 25.863 applicable to electrical equipment, may be satisfied by the following:

1 Electrical components in regions immediately behind firewalls and in engine pod attachment structures should be of such materials and at such a distance from the firewall that they will not suffer damage that could hazard the aeroplane if the surface of the firewall adjacent to the fire is heated to 1100°C for 15 minutes.

2 Electrical equipment should be so constructed and/or installed that in the event of failure, no hazardous quantities of toxic or noxious (e.g. smoke) products will be distributed in the crew or passenger compartments.

3 Electrical equipment, which may come into contact with flammable vapours should be so designed and installed as to minimise the risk of the vapours exploding under both normal and fault conditions. This can be satisfied by meeting the Explosion Proofness Standards of **RTCA DO-160/EUROCAE ED-14**.

14 - How does the proposed standard compare to the current ICAO standard? *[Indicate whether the proposed standard complies with or does not comply with the applicable ICAO standards (if any)]*

There is no specific ICAO standard for this subject

15 - Does the proposed standard affect other HWG's? *[Indicate whether the proposed standard should be reviewed by other harmonization working groups and why.]*

This proposal does not affect other HWG's.

16 - What is the cost impact of complying with the proposed standard? *[Is the overall cost impact likely to be significant, and will the costs be higher or lower? Include any cost savings that would result from complying with one harmonized rule instead of the two existing standards. Explain what items affect the cost of complying with the proposed standard relative to the cost of complying with the current standard.]*

As the proposal is in line with current design practices, the cost impact will be negligible. No new designs, testing, equipment installations, or maintenance procedures are anticipated.

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

No.

18 – In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain. *[A negative answer to this question will prompt the FAA to pull the project out of the Fast Track process and forward the issues to the FAA's Rulemaking Management Council for consideration as a "significant" project.]*

The ESHWG considers that the fast track harmonization process is appropriate for this rule.

Bundled with #3

ANM-00-262-A

RPR # ANM-00-262-A

ARAC ESHWG REPORT 25.1357

Elec-Equip

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

The safety issue addressed by FAR/JAR 25.1357 is the use, functional requirements and installation requirements of electrical circuit protective devices.

2 - What are the current FAR and JAR standards?

Current FAR text:

Section 25.1357 Circuit protective devices.

(a) Automatic protective devices must be used to minimize distress to the electrical system and hazard to the airplane in the event of wiring faults or serious malfunction of the system or connected equipment.

(b) The protective and control devices in the generating system must be designed to de-energize and disconnect faulty power sources and power transmission equipment from their associated busses with sufficient rapidity to provide protection from hazardous over-voltage and other malfunctioning.

(c) Each resettable circuit protective device must be designed so that, when an overload or circuit fault exists, it will open the circuit irrespective of the position of the operating control.

(d) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be located and identified so that it can be readily reset or replaced in flight.

(e) Each circuit for essential loads must have individual circuit protection. However, individual protection for each circuit in an essential load system (such as each position light circuit in a system) is not required.

(f) If fuses are used, there must be spare fuses for use in flight equal to at least 50 percent of the number of fuses of each rating required for complete circuit protection.

(g) Automatic reset circuit breakers may be used as integral protectors for electrical equipment (such as thermal cut-outs) if there is circuit protection to protect the cable to the equipment.

Current JAR text:

JAR 25.1357 Circuit protective devices.

(a) Automatic protective devices must be used to minimize distress to the electrical system and hazard to the aeroplane in the event of wiring faults or serious malfunction of the system or connected equipment. (See ACJ 25.1357(a))

(b) The protective and control devices in the generating system must be designed to de-energise and disconnect faulty power sources and power transmission equipment from their associated busses with sufficient rapidity to provide protection from hazardous over-voltage and other malfunctioning.

(c) Each resettable circuit protective device must be designed so that, when an overload or circuit fault exists, it will open the circuit irrespective of the position of the operating control.

(d) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be located and identified so that it can be readily reset or replaced in flight. Where fuses are used, there must be spare fuses for use in-flight equal to at least 50% of the number of fuses of each rating required for complete circuit protection.

(e) Each circuit for essential loads must have individual circuit protection. However, individual protection for each circuit in an essential load system (such as each position light circuit in a system) is not required.

(f) Revoked

(g) Automatic reset circuit breakers may be used as integral protectors for electrical equipment (such as thermal cut-outs) if there is circuit protection to protect the cable to the equipment.

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

The JAR references ACJ 25.1357(a), which adds interpretative material stating that effects of variations in ambient temperatures on either the protective device or the equipment it protects must not result in hazards. This is in line with current industry practice.

The JAR also has the text formerly located in sub-paragraph (f) moved to be included in sub-paragraph (d). This change was made to avoid any confusion that may be created regarding whether the spare fuse requirement also applied to fuses that are inaccessible in flight. This change has not been done in the FAR, but there is no difference in interpretation.

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

Since the JAR standard is in line with current industry practice, the means of compliance is the same, with the addition of showing what effect temperature variations have on the circuit protection and the equipment it protects.

5 – What is the proposed action?

The proposed action is to adopt JAR 25.1357 into FAR and to incorporate its related ACJ 25.1357(a) into FAA advisory material.

6 - What should the harmonized standard be?

The harmonized standard should be:

FAR/JAR 25.1357 Circuit protective devices.

(a) Automatic protective devices must be used to minimize distress to the electrical system and hazard to the airplane in the event of wiring faults or serious malfunction of the system or connected equipment. (See ACJ 25.1357(a).)

(b) The protective and control devices in the generating system must be designed to de-energize and disconnect faulty power sources and power transmission equipment from their associated busses with sufficient rapidity to provide protection from hazardous over-voltage and other malfunctioning.

(c) Each resettable circuit protective device must be designed so that, when an overload or circuit fault exists, it will open the circuit irrespective of the position of the operating control.

(d) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be located and identified so that it can be readily reset or replaced in flight. Where fuses are used, there must be spare fuses for use in-flight equal to at least 50% of the number of fuses of each rating required for complete circuit protection.

(e) Each circuit for essential loads must have individual circuit protection. However, individual protection for each circuit in an essential load system (such as each position light circuit in a system) is not required.

(f) Revoked

(g) Automatic reset circuit breakers may be used as integral protectors for electrical equipment (such as thermal cut-outs) if there is circuit protection to protect the cable to the equipment.

[Note: The reference to ACJ 25.1357(a) specified above in paragraph (a) is for JAR only.]

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

The proposed standard will ensure that there is no confusion about spare fuse requirements for use in-flight and that temperature effects are considered when specifying circuit protection.

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

The proposed standard will maintain the current level of safety by ensuring that there is no confusion regarding spare fuse requirements for use in-flight and that temperature effects are considered when specifying circuit protection.

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

The proposed standard is in line with current industry practice and therefore will maintain the current level of safety.

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

Consideration was given to standardize on the FAR requirements. That option was not selected because it would have allowed the continuation of the confusion regarding the spare fuse requirement, and it does not address consideration for the effect of temperature variation on circuit protection devices and the equipment they protect.

11 - Who would be affected by the proposed change?

The proposal is in line with current design practices and the effect of the change is considered to be minimal for aircraft operators, modification centers, service centers and manufacturers.

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

None

13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?

Existing FAA advisory material does not explicitly address consideration for the effect of temperature variation on circuit protection or on the equipment protected. Therefore, the ESHWG recommends incorporating the ACJ 25.1357(a) into the FAA advisory material.

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

This proposal is in line with ICAO Annex 8 Chapter 8 Electrical Systems.

15 - Does the proposed standard affect other HWG's?

This proposal does not affect other HWG's.

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

Since this standard is in line with current industry practice, the cost impact is considered negligible.

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 the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process?

The ESHWG considers that the Fast Track Process is appropriate for this proposed rule.

FAA Action: Advisory Circular 25.869-1 and Advisory Circular 25.1353-1 in Regulatory Guidance Library