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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.