U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: ELECTRICAL SUPPLIES FOR EMERGENCY CONDITIONS

Date: 10/22/07 **AC No:** 25.1362-1

Initiated by: ANM-100

1. PURPOSE. This advisory circular (AC) provides guidance for demonstrating compliance with the transport category airplane certification requirements of § 25.1362, *Electrical supplies for emergency conditions*.

2. APPLICABILITY.

a. The guidance provided in this document is directed to airplane manufacturers, modifiers, foreign regulatory authorities, Federal Aviation Administration (FAA) transport airplane type certification engineers, and designees.

b. This material is neither mandatory nor regulatory in nature and does not constitute a regulation. It describes acceptable means, but not the only means, for demonstrating compliance with the applicable regulations. We will consider other methods of demonstrating compliance that an applicant may elect to present. While these guidelines are not mandatory, they are derived from extensive FAA and industry experience in determining compliance with the relevant regulations. On the other hand, if we become aware of circumstances that convince us that following this AC would not result in compliance with the applicable regulations, we will not be bound by the terms of this AC, and we may require additional substantiation as a basis for finding compliance.

c. This material does not change or create any additional regulatory requirements, nor does it authorize changes in or permit deviations from existing regulatory requirements.

d. Terms such as “shall” or “must” are used in this AC only in the sense of ensuring applicability of this particular method of compliance when the acceptable method of compliance described herein is used.

3. DEFINITION.

Electrical Wiring Interconnection Systems (EWIS). In part, an EWIS is any wire, wiring device, or combination of these, including termination devices, installed in any area of the airplane for the purpose of transmitting electrical energy between two or more intended termination points. The complete regulatory definition of an EWIS is in § 25.1701, which is included in Appendix A of this AC.

4. COMPLIANCE GUIDANCE.

a. Emergency Services. The emergency services which may require an electrical supply include fuel shut-off valves, hydraulic shut-off valves, and engine/APU fire extinguisher systems. The components and installation of the components associated with providing an electrical supply for services required during emergency procedures after an emergency landing or ditching should be sufficiently and robustly designed, protected, and installed so that the risk of the services being rendered ineffective under these emergency conditions is minimized. Probable failure scenarios should be considered when selecting the components and designing their installation to help ensure that they be capable of shutting off the services that could contribute to a fire under these failure scenarios.

b. Airplane Flight Manual Procedure (AFM). You should provide an appropriate design and/or a clear AFM procedure to prevent disconnection of the electrical supply to the required services before emergency procedures are fully completed.

c. Compliance with § 25.1705. Section 25.1705(b)(10) requires that components of EWIS associated with systems to which § 25.1362 is applicable be considered an integral part of that system or systems and must be considered in showing compliance with the applicable requirements for that system.

d. Instructions for Continued Airworthiness. Instructions for Continued Airworthiness (required by §§ 25.1529 and 25.1729) must include all maintenance actions necessary to maintain the electrical supplies for emergency services throughout the expected service life of the airplane.

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APPENDIX A

§§ 25.1362 and 25.1701

The text of §§ 25.1362 and 25.1701 is repeated here for the convenience of the reader.

§ 25.1362 Electrical supplies for emergency conditions.

A suitable electrical supply must be provided to those services required for emergency procedures after an emergency landing or ditching. The circuits for these services must be designed, protected, and installed so that the risk of the services being rendered ineffective under these emergency conditions is minimized.

§ 25.1701 Definition.

(a) As used in this chapter, electrical wiring interconnection system (EWIS) means any wire, wiring device, or combination of these, including termination devices, installed in any area of the airplane for the purpose of transmitting electrical energy, including data and signals, between two or more intended termination points. This includes:

(1) Wires and cables.

(2) Bus bars.

(3) The termination point on electrical devices, including those on relays, interrupters, switches, contactors, terminal blocks and circuit breakers, and other circuit protection devices.

(4) Connectors, including feed-through connectors.

(5) Connector accessories.

(6) Electrical grounding and bonding devices and their associated

connections.

(7) Electrical splices.

(8) Materials used to provide additional protection for wires, including wire insulation, wire sleeving, and conduits that have electrical termination for the purpose of bonding.

(9) Shields or braids.

(10) Clamps and other devices used to route and support the wire bundle.

(11) Cable tie devices.

(12) Labels or other means of identification.

(13) Pressure seals.

(14) EWIS components inside shelves, panels, racks, junction boxes, distribution panels, and back-planes of equipment racks, including, but not limited to, circuit board back-planes, wire integration units, and external wiring of equipment.

(b) Except for the equipment indicated in paragraph (a)(14) of this section, EWIS components inside the following equipment, and the external connectors that are part of that equipment, are excluded from the definition in paragraph (a) of this section:

(1) Electrical equipment or avionics that are qualified to environmental conditions and testing procedures when those conditions and procedures are —

(i) appropriate for the intended function and operating environment, and

(ii) acceptable to the FAA.

(2) Portable electrical devices that are not part of the type design of the airplane. This includes personal entertainment devices and laptop computers.

(3) Fiber optics.

APPENDIX B

RELATED REGULATIONS AND DOCUMENTS

Regulations. You can download an electronic copy of 14 CFR from the Internet at http://www.gpoaccess.gov/cfr/. A paper copy can be ordered by sending a request to the U.S. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402-0001, or by calling telephone number (202) 512-1800; or by sending a request by facsimile to (202) 512-2250.

- § 25.1189 Shutoff means
- § 25.1195 Fire extinguishing systems
- § 25.1301 Function and installation
- § 25.1309 Equipment, systems, and installations
- § 25.1529 Instructions for Continued Airworthiness
- § 25.1585 Operating procedures
- § 25.1701 Definition (of EWIS)
- § 25.1703 Function and installation: EWIS
- § 25.1705 Systems and Functions: EWIS
- § 25.1729 Instructions for Continued Airworthiness: EWIS

Advisory Circulars. You can download an electronic copy of the latest version of the following ACs from the FAA Internet at http://rgl.faa.gov.

- 25.1309-1System Design and Analysis
- 25.1701-1 Certification of Electrical Wiring Interconnection Systems on Transport Category Airplanes

Reports. You can download an electronic copy of the following report from the "Final Reports" section of the Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) website: www.mitrecaasd.org/atsrac.

"Task 6 Final Report," dated October 29, 2002, Aging Transport Systems Rulemaking Advisory Committee.

APPENDIX C

Following is the discussion of § 25.1362 published in the *Federal Register* on October 6, 2005 (70 FR 58508), in Notice of Proposed Rulemaking No. 05-08, Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS), at the time this rule was proposed.

Section 25.1362 Electrical supplies for emergency conditions.

The FAA proposes to add a new section, § 25.1362, about electrical supplies for emergency conditions. There is no part 25 standard addressing electrical supplies for emergency conditions equivalent to JAR 25.1362. Partial coverage is provided by §§ 25.1189, 25.1195, 25.1309, and 25.1585.

The JAR 25.1362 and associated ACJ material were created to ensure that electrical supplies for emergency functions (such as fuel and hydraulic shut-off valves) are maintained so they are operable after the flight crew has switched off the main power sources. This is necessary so emergency procedures can be performed. Since there is no equivalent standard to JAR 25.1362 in part 25, but partial coverage is provided by §§ 25.1189, 25.1195, 25.1309, and 25.1585, application of JAA standards by US manufacturers and aircraft operators has sometimes resulted in different designs for the powering of appropriate emergency functions.

The proposed action would adopt a new § 25.1362 harmonized to a revised JAR 25.1362. The new harmonized standard would provide for a consistent application of the standards. The ACJ would be revised and adopted as a new AC by the FAA. This proposed rule and advisory material would provide flexibility by allowing either an appropriate airplane flight manual (AFM) procedure or design implementation to achieve compliance with the standards.

This proposal addresses the underlying safety issue by ensuring that appropriate electrical power supplies are maintained to emergency services after the main power sources have been switched off by the flightcrew. The proposal increases the level of safety by focusing on appropriate methods to ensure that electrical power is provided for emergency functions during emergency landing or ditching conditions. It is in line with current industry practice. Another option considered was to adopt the existing JAR and ACJ into 14 CFR. But revising the JAR and the ACJ material and creating a new § 25.1362 and AC 25-1362 results in a harmonized standard that would provide greater flexibility for compliance.

Since this proposed change is in line with current design practices, the effect is considered to be minimal for aircraft operators and manufacturers affected by this change.

There is no FAA advisory material available. This proposal would create a new AC 25-1362 harmonized with ACJ 25X1362.