



AEROSPACE STANDARD

AS6349™

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Minimum Performance Standard (MPS) for an Airborne AC to AC Converter

RATIONALE

This SAE Aerospace Standard (AS) establishes the minimum performance standards for an AC to AC converter power sources in aerospace electric power systems. AC to AC converters are designed and used as a subsystem to deliver various AC voltage levels within power distribution systems for general aviation applications, cockpit lighting and aircraft cabin interiors.

AS6349 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This SAE Aerospace Standard (AS) establishes the minimum performance standards for equipment used as secondary alternating current (AC) electrical power sources in aerospace electric power systems.

1.1 Purpose

The purpose of this document is to define the guidelines and minimum performance standards to be met by static electric power converters designed to operate from primary electric power systems. The tests specified herein provide a laboratory means to determine the performance and reliability characteristics of electric power converters under electrical and environmental conditions representative of those encountered in actual aerospace applications.

1.2 Field of Application

Static electric power converter equipment whose initial application is to provide three phase or single phase AC power of a desired frequency by converting nominal AC power of a different frequency. The converter shall be designed to provide AC power for aerospace utilization systems and equipment, but not limited to aerospace use.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS1212 Electrical Power, Aircraft, Characteristics and Utilization Of

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<https://www.sae.org/standards/content/AS6349/>

Documents

Standard, visit Sharing Hub

2.1.2 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-HDBK-217 Reliability Prediction of Electronic Equipment

MIL-HDBK-263 Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) Metric

2.1.3 RTCA Publications

Available from RTCA, Inc., 1150 18th Street, NW, Suite 910, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

RTCA/DO-160 Environmental Conditions and Test Procedures for Airborne Equipment

2.2 Definitions

2.2.1 AEROSPACE ELECTRIC POWER CONVERTER

Equipment, or a combination of equipment, used to convert nominal AC aircraft power of a different frequency range to three phase or single phase AC power at 50, 60 or 400 Hz, typically.

2.2.2 DEFINITION OF TERMS

Unless otherwise specified herein, the terms used are those defined in RTCA Document Number DO-160.

2.2.3 STATIC

Equipment that does not utilize mechanical devices as active components of the power conversion technology.

2.2.4 VARIABLE COMPONENT

Electrically or mechanically adjustable component.

2.2.5 ONE-THIRD UNBALANCED LOAD

In a three-phase system, where two phases are carrying equal load and the third phase is carrying 1/3 phase rated load (1/9 of the product's total rated load) more. For example, A-Phase: 1/3 phase rated load, B-Phase: 1/3 phase rated load, C-Phase: 2/3 phase rated load. The load on any individual phase not to exceed phase rated load.

2.2.6 TWO-THIRDS UNBALANCED LOAD

In a three-phase system, where two phases are carrying equal load and the third phase is carrying 2/3 phase rated load (2/9 of the product's total rated load) more. For example, A-Phase: 1/3 phase rated load, B-Phase: 1/3 phase rated load, C-Phase: full phase rated load. The load on any individual phase not to exceed phase rated load.

3. TECHNICAL REQUIREMENTS

3.1 General

3.1.1 Design and Construction

The design, construction, finishes, and marking shall be consistent with the standards of aerospace industry good aircraft practice. Terminals, connections, components and conductors shall be designed to preclude accidental shorting, polarity reversal, improper installation, and contact with personnel or foreign conductive materials.

3.1.2 Adjustments and Controls

Controls and/or variable components that are not normally adjusted in flight shall not be readily accessible to flight personnel.

3.1.3 Flammable Materials

Except for small parts (i.e., seals, grommets, fasteners) and other small electrical parts that would not contribute significantly to the propagation of a fire, all materials used in the equipment shall be non-burning or self-extinguishing and shall not release toxic gases.

3.1.4 Reliability

As a minimum requirement, reliability predictions shall be made available. The statistical analysis shall be based on field usage and/or reliability analysis that is completed and documented. Reference tools for this process include but may not be limited to MIL-HDBK-217.

3.1.5 Handling of Product

Any special handling requirements during testing or installation of the product shall be identified. General guidelines for ESD handling of products should be referenced to MIL-HDBK-263.

3.2 Electrical Performance

3.2.1 Rated Input Voltage

The rated input voltage, as measured at the converter input connector, shall be 115 V AC nominal (line to neutral for three phase input and line to line for single phase input). The converter shall be capable of continuous operation under full load without degradation of performance over an input voltage range of 100 through 122 V AC (line to neutral for three phase input and line to line for single phase input).

3.2.2 Rated Input Frequency

The rated input frequency, as measured at the converter input connector, shall be 400 Hz nominal. The converter shall be capable of continuous operation under full load without degradation of performance between 390 to 410 Hz.

3.2.3 Input Momentary Power Interruptions

The converter shall ride through or automatically recover from input power interruptions (0 V RMS) between 5 and 200 ms while operating at full load. Compliance shall be verified with the converter operating at minimum input voltage at nominal input frequency, as specified in 3.2.1 through 3.2.2. Each test condition shall be repeated five times, within a 5-minute period, using 0 voltage interruption periods of 5, 10, 25, 50, 100, 150, and 200 ms for each interruption. The converter shall not be degraded or damaged as a result of momentary power interruptions.

3.2.4 Input Phase Reversal (3-Phase Converters)

The converter shall be designed to operate with an input phase rotation of A-B-C, and shall not be damaged with an input phase rotation of C-A-B or C-B-A. A physical means of protection, such as a keyed input connector, may be used to comply with this requirement.

3.2.5 Rated Output Voltage

The average phase output voltage, under the input specified in 3.2.1 through 3.2.2 and under all conditions of test environment, shall be $\pm 3\%$ of the rated output voltage.