SLOVENSKI STANDARD
SIST EN 3371:2019

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Aeronavtika - Električna vezava - Tehnična specifikacija

Aerospace series - Electrical bonding - Technical specification

Luft- und Raumfahrt - Masseverbindung - Technische Lieferbedingungen

Série aérospatiale - Métallisation - Spécification technique

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Aerospace series - Electrical bonding - Technical specification

Série aérospatiale - Métallisation - Spécification technique

Luft- und Raumfahrt - Elektrische Masseverbindung - Technische Lieferbedingungen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 3371:2019) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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Introduction

This document has taken into consideration STANAG 3659.

1 Scope

This document specifies the characteristics as well as the verification of bonding in on-board aircraft electrical systems.

They refer basically to requirements relating to the effect of lightning, return currents, electromagnetic interference, as well as to the accumulation of electrostatic charges and personnel shock hazard.

This standard states the maximum permissible resistance values which guarantee, according to the installation, good conductivity of the whole of the structure, of the whole installation and the bonding terminals; these values shall ensure correct operation of the systems.

The rules of installation are defined in EN 3197.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 3197, *Aerospace series — Design and installation of aircraft electrical and optical interconnection systems*

STANAG 3659, *Electrical bonding requirements for metallic aircraft systems* 1)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
chassis
represents the whole of the metallic parts electrically connected to each other, of a support or piece of equipment whose potential generally represents the reference potential (earth "0" volt)

1) Published by: NATO EU Mil. - National (US) Mil. North Atlantic Treaty Organization http://www.nato.int/docu/standard.htm

3.2
bonding
process of connecting together metal parts so that they make low resistance electrical contact for direct current and low frequency alternating current

Note 1 to entry: Necessary for getting a low resistant electrical current path.

3.3
grounding
the bonding of an equipment case, frame or chassis to an object or vehicle structure to ensure common potential

Note 1 to entry: Necessary for getting a common potential, also for keeping up a common potential at a high electrical fault - or lightning strike caused - current by the means of low grounding resistant electrical current path which are equal to means for bonding.

3.4
earthing
the process of making a satisfactory electrical connection between structure, including the metal skin of an object or vehicle at the mass of earth to ensure a common potential with the earth

Note 1 to entry: Necessary for getting a common potential of the earth.

3.5
equipotential connection
an electrical connection which feeds the same potential to the elements of power production in addition to the other parts

3.6
category I or II
the Category I or II is determined by a common agreement between the aircraft manufacturer and the official services

4 Primary bonding

They comprise the whole of the conducting parts of the structure, of bonding parts and conductors which can be traversed by considerable energy (lightning discharge currents).

4.1 Main structure

The assemblies forming the structures are generally good conductors and allow the discharge of static charges and lightning currents.

The structures are generally used as a return current path for the sum of the currents of the on-board electrical installation (for example: under a current of 300 A it is usual to measure resistance from 0,2 mΩ to 2 mΩ between 2 (two) points about 30 m apart.

4.2 Detachable parts

In principle, parts (non-articulated access doors, for example) attached by a significant number of metallic screws shall ensure good electrical continuity and shall not require the addition of bond braids.

The metallic parts attached by quarter turn screws are bonded by suitable methods (braids, contact arms, interposition of conducting materials, etc.).

4.3 Articulated parts

Parts which are articulated and placed permanently or temporarily on the exterior of the aircraft such as control surfaces, doors, hatches, gear legs shall be correctly bonded, taking the following 2 (two) points into consideration:

- the articulation can be, by its construction, made sufficiently conductive even if it is lubricated, provided that the contact pressure is sufficient;
- the articulation is not conductive by the nature of its materials or protection used.

In this instance, it is advisable to ensure bonding by a number of bond braids, ensuring redundancy and with the shortest possible length arranged so as to avoid any loop or risk of jamming during operation or by suitable means.

4.4 Fuel tank covers and holes

The design of the tank covers shall be such that there is no danger of inflammation of vapour, should lightning strike these covers directly.

The refuelling and drainage holes, and air vents shall be carefully bonded.

4.5 Engines and auxiliary starter unit

The main articulated attachments for the cooling system and/or ball joints shall be shunted by a braid, unless the electrical continuity between engine and structure is permanently ensured by fixed attachment points.

The fixed or moveable pipes shall also be bonded in relation to the jet engine either by construction or braids.

4.6 Non-metallic external parts

The non-metallic components, especially in areas where there is high probability of lightning (radome, wing tips and extremities of stabilizer, fin, etc.) shall be correctly protected and bonded to allow electrostatic charges to be discharged and provide effective protection against the effects of lightning.

4.7 External protruding parts

4.7.1 Internal metallic parts protruding on the exterior of the aircraft (Pitot tube, drain, for example) shall be bonded to the structure at a point situated as close as possible on the aircraft skin.

4.7.2 Protruding parts connected to the on-board electrical circuit (sensors - Pitot tubes)

Extremely good bonding is necessary to reduce possible damage to the on-board aircraft electrical system.

4.8 Ground connections

Their composition, form, section, length shall be selected in relation to the result to be obtained (minimum bonding resistance).

They shall be as short as possible.

The choice of attachment points shall be such that the join is as direct as possible, avoiding loops.

5 Secondary bonding

There are several groups in this category:

- electrical current returns by the aircraft structure;
- grounding of all metallic parts necessary for correct operation of electrical circuit protection;
- the discharge paths for electrostatic charges;
- the grounding of electrical shielding;
- the dischargers of electrostatic charges;
- the earthing of the aircraft on the ground;
- the grounding of equipment to avoid electromagnetic interferences.

5.1 Return of electrical currents by the structure

Grounding equipment or circuits

Particular care should be taken concerning the quality of electrical contact to the structure.

The structural part on to which the bonding is made shall be carefully chosen.

Ensure that the bonding points have adequate cross sectional area.

5.2 Grounding to avoid danger of electrical shock

Electrical panels or other equipment accessible to the occupants of the aircraft (circuits with voltages of over 42 V) shall be bonded to avoid the danger of electrical shock.

Articulated panels which are not detachable, attached by screws or similar metallic components, are only provided with braids if the contact ensured by the attachments is considered uncertain or inadequate.

5.3 Discharge of electrostatic charges

The accumulation of significant electrostatic charges on the various metallic parts or insulators of the aircraft shall be avoided by ensuring correct discharge of these charges on the main structure of the aircraft. The electrostatic charges are discharged in flight by dischargers.

The dischargers shall be fitted in sufficient number and adequately located (because of their possible interaction with the aerial circuits) to ensure correct discharge into the atmosphere of stored electrostatic charges.