SLOVENSKI STANDARD
SIST EN 4703:2023

01-marec-2023

Aeronavtika - Specifikacija preskusa za preverjanje prepustnosti izolacije električne opreme

Aerospace series - Test specification for verification of the permeability of electrical insulation

Luft- und Raumfahrt - Testverfahren zur Überprüfung der elektrischen Isolationsfestigkeit

Série aérospatiale - Spécification d'essai pour la vérification de la perméabilité de l'isolation électrique

Ta slovenski standard je istoveten z: **EN 4703:2022**

ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

SIST EN 4703:2023 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4703

December 2022

ICS 49.060

English Version

Aerospace series - Test specification for verification of the permeability of electrical insulation

Série aérospatiale - Spécification d'essai pour la vérification de la perméabilité de l'isolation électrique

Luft- und Raumfahrt - Testverfahren zur Überprüfung der elektrischen Isolationsfestigkeit

This European Standard was approved by CEN on 22 August 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 4703:2022 E

Contents

Page

European foreword

This document (EN 4703:2022) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, 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 June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Republic of North Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

1 Scope

This document specifies a test that determines the ability of electrical equipment to withstand wet atmospheres in combination with variable ambient air pressure in particular in an aircraft installation. The main adverse effects to be anticipated are fluid ingress and related insulation breakdown.

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.

ISO 2678, *Environmental tests for aircraft equipment — Insulation resistance and high voltage tests for electrical equipment*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
LCR meter
type of electronic test equipment used to measure the inductance (L), capacitance (C) and resistance (R) of an electronic component

4 Test set-up

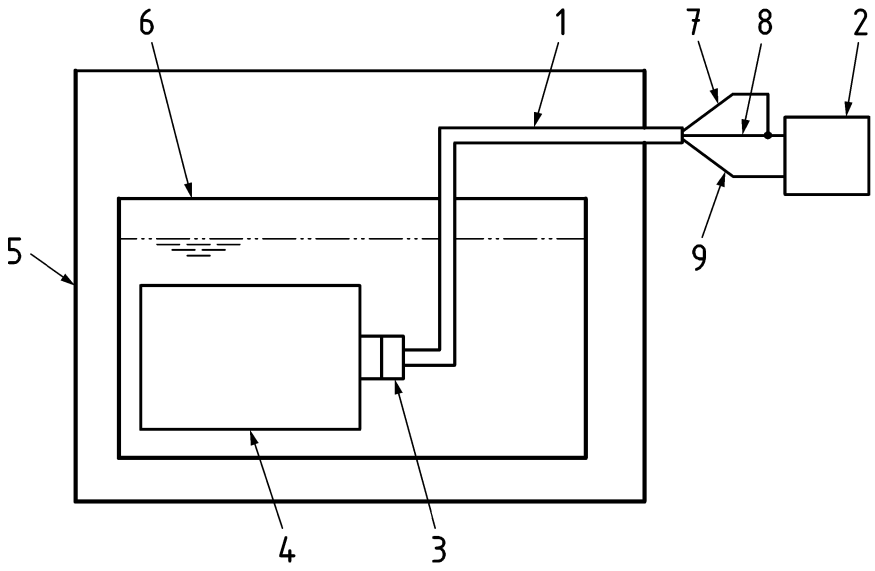
4.1 General set-up

4.1.1 General

The test shall be conducted inside a suitable test chamber. The temperature inside the chamber shall be 15 °C to 35 °C. The unit under test (UUT) shall be placed in a suitable, electrically non-conducting container filled with tap water. NaCl shall be dissolved in the tap water until a conductivity value of 1 mS cm^{-1} ± 0,1 mS cm^{-1} has been attained. The conductivity shall be measured with a conductivity meter. Depending on the kind of insulation test, two different insulation test devices shall be connected in different ways.

4.1.2 Test set-up 1: HV-insulation resistance measurement

Figure 1 outlines the test set-up for a measurement of the insulation resistance between live parts and an electric shield covering the UUT. A high voltage (HV) insulation resistance tester that complies with ISO 2678 shall be placed and connected outside the test chamber. The supply wires (7 and 8) shall be short-circuited and connected to one terminal of the insulation tester, the shield wire (9) shall be connected to the other terminal of the insulation tester.



Key

1 Harness
2 Insulation tester (high voltage tester)
3 Receptacle
4 UUT
5 Test chamber
6 Container filled with test fluid (tap water with NaCl dissolved)
7 Live wire
8 Ground wire
9 Shield wire

Figure 1 — Test set-up 1: HV high voltage insulation resistance measurement

4.1.3 Test set-up 2: Sheath integrity measurement

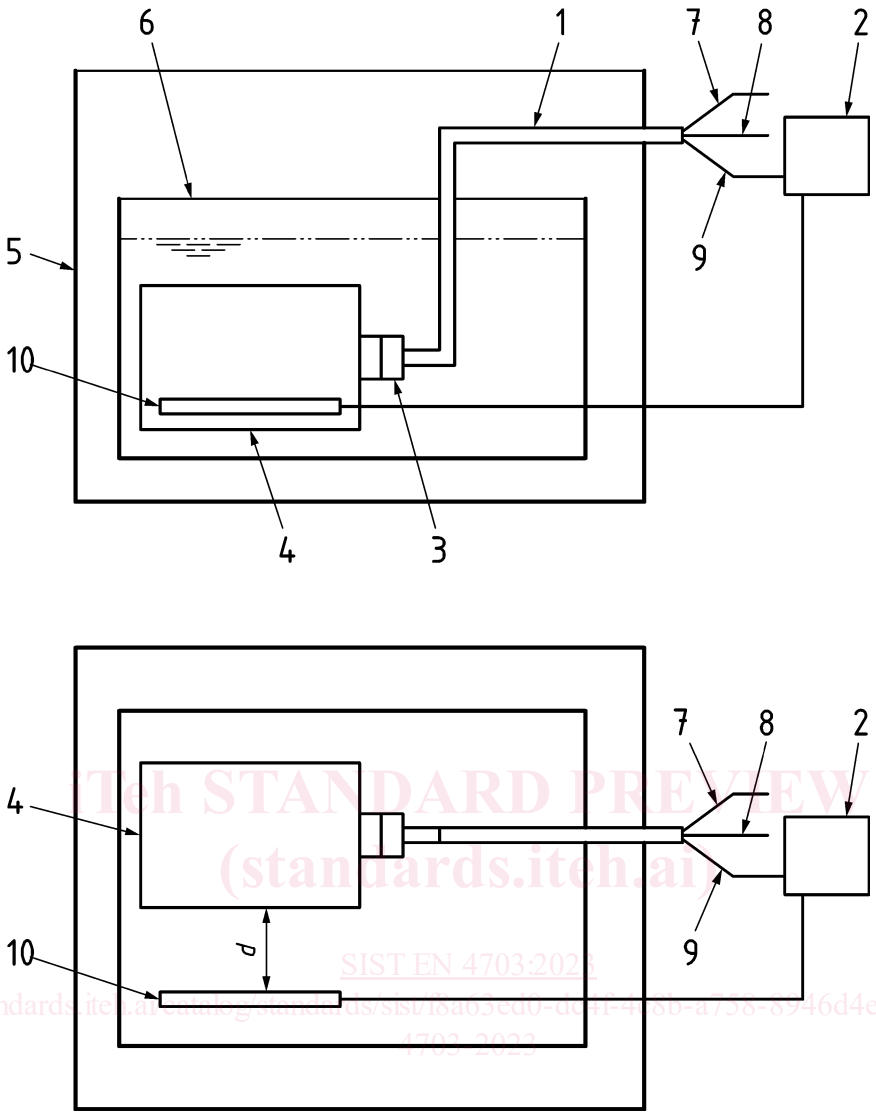
The second test set-up is based on the first test set-up in Figure 1. Figure 2 outlines the test set-up for the measurement of the integrity of the insulation between an electrically conducting part of the UUT and an external electrode immersed into the test fluid additionally. The electrode shall be made of platinum or platinum coated metal. The electrical resistance measured between both ends of the electrode shall be < 1 Ω.

The insulation tester is a two terminal LCR meter that shall comply with the following requirements: measurement voltage below 1 V, measurement frequencies at 1 kHz and 100 kHz available, capable to indicate serial capacitance, phase angle and parallel resistance, upper resistance measurement limit > 100 MΩ and lower capacitance measurement limit < 1 pF.

The conducting part to be tested, usually the shield (9), shall be electrically connected to one terminal of the LCR-meter through the connecting wire. The external electrode shall be electrically connected to the other terminal of the LCR-meter. The external electrode shall be fixed within a distance *d* of 2 cm to 10 cm from the UUT in a central position.

The largest projected surface area of the UUT shall face the electrode. The distance of each point of the surface to the electrode shall be less than 50 cm. Multiple parallel connected electrodes may be used to fulfil this requirement.

The total surface area of the electrode shall be minimum 8 cm^2.



Key

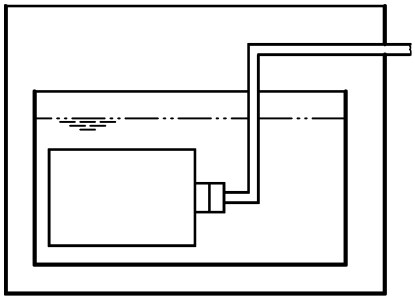
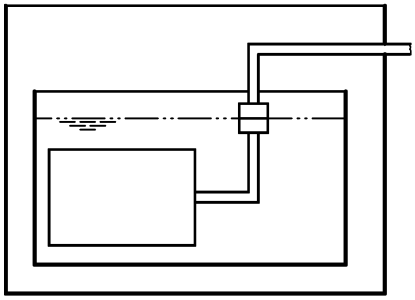
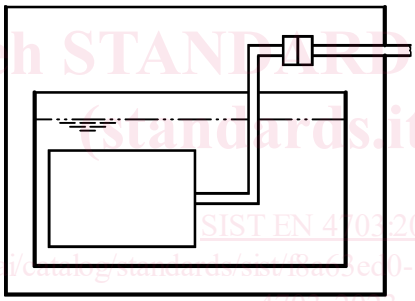
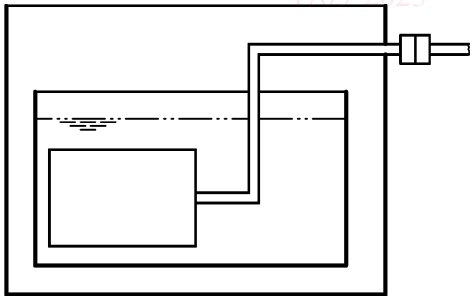
1 Harness
2 Insulation tester (LCR meter)
3 Receptacle
4 UUT
5 Test chamber
6 Container filled with test fluid (tap water with NaCl dissolved)
7 Live wire
8 Ground wire
9 Shield wire
10 Electrode
d Distance

Figure 2 — Test set-up 2: Integrity measurement of the sheath

4.2 Immersion of receptacle

The UUT can include an additional receptacle to be tested. Depending on the purpose of the unit to be tested the receptacle of the unit can be immersed (A), partially immersed (B) or not immersed (C, D) in the test fluid, according to Table 1. If the connector shall be partially immersed, it shall be specified if the connector's split line shall be above or below the fluid level. If the connector shall not be subjected to the salt environment of the chamber, category (D) shall be selected for the test set-up.

Table 1 — Receptacle immersion categories

Category	Set-up schematic	Description
A		Connector immersed in test fluid
B		Connector partially immersed in test fluid
C		Connector not immersed in test fluid, inside test chamber
D		Connector outside test chamber

4.3 Operation of test unit

Depending on the purpose of the unit to be tested, the unit can be operated (1), powered but non-operated (2) or non-powered, non-operated (3), according to Table 2.

Table 2 — Operation of test unit

Category	Description
1	UUT operated
2	UUT powered, non-operated
3	UUT non-powered, non-operated

5 Test procedure

The test procedure shall be done according to the following steps:

a) adjust temperature as given in general test conditions, while the chamber pressure is equal to ambient pressure;

b) place the equipment into the operating state as specified;

c) decrease chamber pressure to 20 kPa (if not otherwise specified) within 5 min to 15 min and maintain this pressure for a total of 120 min (i.e. including the time taken to decrease the pressure);

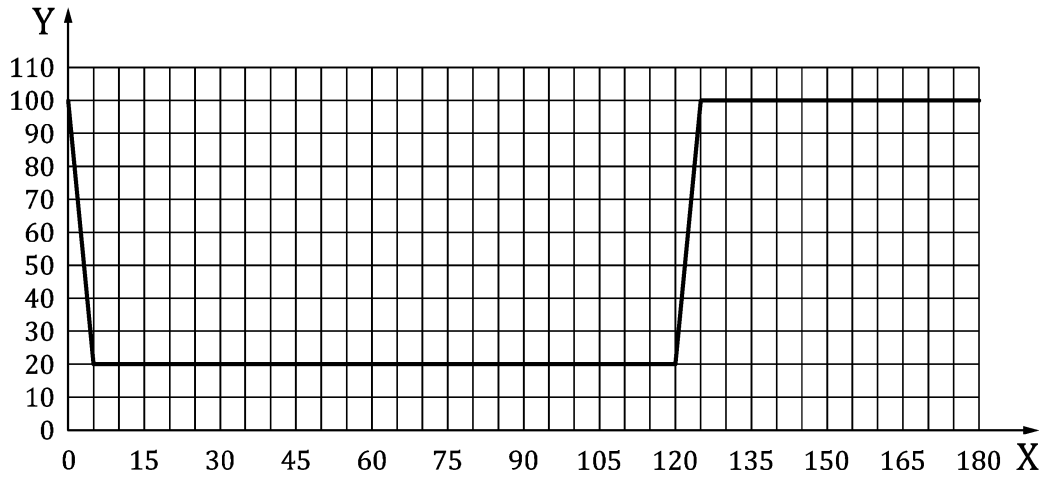
d) increase chamber pressure to ambient pressure within 5 min and maintain this pressure for a total of 60 min (i.e. including the time taken to raise the pressure);

e) steps c) and d) constitute a cycle with a period of 180 min;

f) repeat steps c) and d) eight times providing 8 cycles per day (24 h);

g) repeat step f) for at least 30 days to give a total of 240 cycles.

NOTE The Figure 3 below indicates one cycle of a duration of 3 h.



Key

X Time in min

Y Pressure in kPa

Figure 3 — Pressure profile for one three-hour cycle