SLOVENSKI STANDARD
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Aeronavtika - Električni kabli za uporabo v zračnih plovilih - Preskusne metode - 307. del: Napetost koronske izgube

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 307: Corona extinction voltage

Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 307: Corona-Aussetzspannung

Série aérospatiale - Câbles électriques à usage aéronautique - Méthodes d'essais - Partie 307: Tension d'extinction corona

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Aerospace series - Cables, electrical, aircraft use - Test methods - Part 307: Corona extinction voltage

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 3475-307:2010) 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of an identical text or by endorsement, at the latest by January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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This document supersedes EN 3475-307:2005.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

For an electrical cable, the presence of partial discharges effects at operating voltage may result in a significant reduction of service life.

Some insulation materials are more susceptible to such discharge damage than others.

Evidence of partial discharges during operation signifies for example:

— the insulation thickness is insufficient for the applied voltage;

— the quality of the insulation is inadequate possibly due to excessive size of internal cavities or voids;

— an overstress is present, resulting in a local reduction of the cable insulation properties.

Significant parameters may influence PDIV and PDEV such as pressure, temperature, humidity, previous electrification, rate of the voltage increase. Attention should be given to installation conditions, for example excessive bending or surface wrinkling of insulation should be avoided.

Up to few tens of kHz frequency can be considered as non-significant parameter.

1 Scope

This test standard defines methods to cover the detection and measurement of partial discharge (corona) under an applied test voltage, including the determination of partial discharges (corona) inception and extinction voltages as the test voltage is raised and lowered, of electrical cables for aircraft use.

It shall be used together with EN 3475-100.

2 Normative references

The following referenced documents are indispensable for the application 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 3475-100, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 100: General*

EN 60270, *High-voltage test techniques — Partial discharge measurements*.

ASTM D 1868, *Standard test method for detection and measurement of partial discharge (Corona) pulses in evaluation of insulation systems* [1)]

3 Terms and definitions

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

3.1
partial discharge inception voltage
PDIV
lowest voltage at which continuous partial discharges occur as the applied voltage is increased

3.2
partial discharge extinction voltage
PDEV
highest voltage at which partial discharges no longer occur as the applied voltage is decreased from the inception voltage described before

NOTE More precise information on the partial discharge phenomenon, such as definition, can be found in ASTM D 1868-07 or in EN 60270.

4 Applicability

This test method is suitable for coaxial cables, high voltage cables and for thin wall insulated cables. Three methodologies are proposed to cover: coaxial cables (Method A), wires used in altitude (Method B) and wires in ambient conditions (Method C).

5 Apparatus

The equipment shall be capable of detecting partial discharges of five picocoulombs or less.

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1) Published by: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 USA.

The detection equipment, cautions and measurement procedures shall be equivalent to those described in ASTM D 1868 or in EN 60270.

The frequency of the test voltage shall be between 48 Hz to 62 Hz.

6 Methods

6.1 General

Three methods are proposed according to specific needs.

Unless otherwise specified in the concerned product standard Method A applies.

The minimum specimen length shall be chosen so that its capacitance is matched to the needs of the detecting equipment to permit observation of discharges of the level described in Clause 5. Use ASTM D 1868 for guidance to determine this length. In any case the minimum length under test shall not be less than 850 mm.

It is particularly important that the ends of specimen to test shall be made corona free.

WARNING — Lethal voltage may be present during this test. It is essential that procedures and test apparatus be properly defined and used for safe operation.

6.2 Method A

6.2.1 Case of use

This method is particularly dedicated to measure PDEV of coaxial cables, under ambient conditions.

6.2.2 Specimen preparation

A suggested method for making the ends corona free is shown on Figure 1 to Figure 3.

Step 1: If compatible with Clause 6 above, suggested length of cable specimen is 1 m.

Step 2: Remove 75 mm of the jacket material from each end.

Dimensions in millimetres

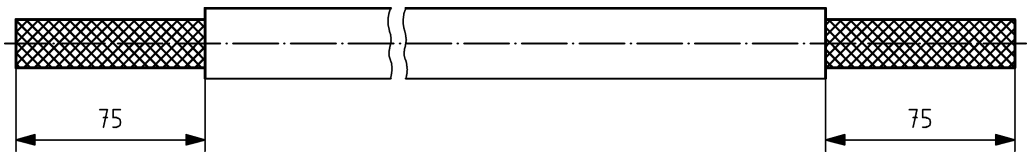

Figure 1

Step 3: Roll back the braid over the jacket and trim as shown. Be careful to avoid breaking any strands. Trim the braid edges nearly to 25 mm lengths.

Dimensions in millimetres

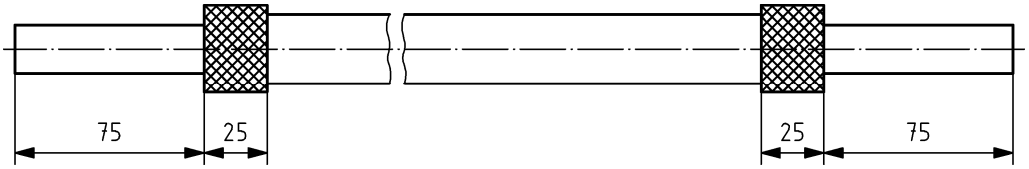

Figure 2

Step 4: Trim one end of the specimen to the dimensions shown and cover the braid edge and jacket with a plastic tube or adhesive tape or heat-shrink sleeve as shown. On the other end, wrap a gauge 20 coated copper grounding wire tightly over the braid or use an equivalent grounding method.

Dimensions in millimetres

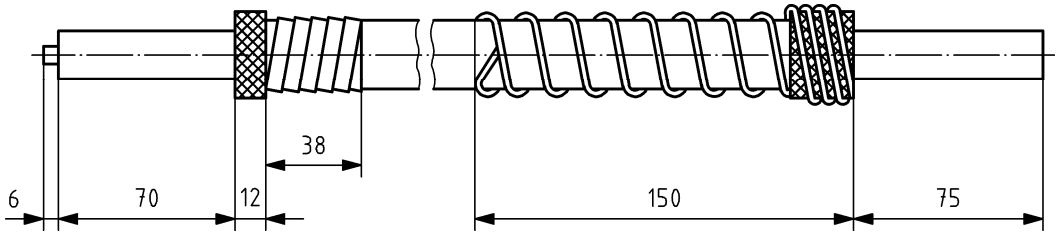

Figure 3

6.3 Method B

6.3.1 Case of use

This method is particularly dedicated to single wires, without screen, used in altitude (low pressure) in non-pressurized areas under particular temperature conditions.

6.3.2 Specimen preparation

Specimens must be prepared as described in 6.2.2, with the addition of a braid, as close as possible to the wire insulation without any risk of superficial damage. Strip the two ends.

NOTE Temperature acceptable by additional materials should be compatible with temperature called for this test by the concerned product standard.

Form one minimum loop with a diameter corresponding to the minimum bend radius specified for each gauge in its concerned technical specification (for example: Table 4 of EN 2084:2005); see Figure 4. Maintaining of the loop shall not be source of crushing.

Measurements shall be made between joined ends of the wire and the end of the grounding method.

Then each specimen shall be put in a vacuum chamber where required pressure and temperature can be obtained.