SLOVENSKI STANDARD
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Aeronavtika - Električni kabli za uporabo v zračnih plovilih - Preskusne metode - 604. del: Odpornost proti električnemu obloku v suhih razmerah

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 604: Resistance to dry arc propagation

Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 604: Lichtbogenfestigkeit, trocken

Série aérospatiale - Câbles électriques à usage aéronautique - Méthodes d'essais - Partie 604 : Résistance à l'amorçage et à la propagation d'arc électrique, essai à sec

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Aerospace series - Cables, electrical, aircraft use - Test methods - Part 604: Resistance to dry arc propagation

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

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Foreword

This document (EN 3475-604:2010) 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of an identical text or by endorsement, at the latest by January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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

This document supersedes EN 3475-604:2002.

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.

1 Scope

This standard specifies a method for appraising the behaviour of cable insulation when an electric arc is initiated and maintained by two powered cables rubbing against a blade.

This standard shall be used together with EN 3475-100.

The primary aim of this test is:

— to produce, in a controlled fashion, continuous failure effects which are representative of those which may occur in service when a typical cable bundle is damaged by abrasion such that electrical arcing occurs, both between cables and between cables and conductive structure; and

— to examine the aptitude of the insulation to track, to propagate electric arc to the electrical origin.

Originally defined for 115 Vac network, this test also proposes conditions for 230 Vac network. Unless otherwise specified in product standard, only 115 Vac conditions shall be satisfied.

Six levels of prospective fault current have been specified for concerned cable sizes (see Clause 7). It is generally agreed that larger sizes need not be assessed since the short-circuit phenomenon becomes dominant at low line impedances.

Unless otherwise specified in the technical/product standard sizes 002, 006 and 020 cable shall be assessed.

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 2350, *Aerospace series — Circuit breakers — Technical specification*

EN 2702:2005, *Aerospace series — Aluminium alloy AL-P6061 — T6 or T62 — Drawn or extruded bar and section — a or D ≤ 200 mm*

EN 3197, *Aerospace series — Installation of aircraft electrical and optical interconnection systems* [1)]

EN 3475-100, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 100: General*

EN 3475-302, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 302: Voltage proof test*

A-A-52083, *Tape, lacing and tying, glass* [2)]

1) Published as ASD STAN Prestandard at the date of publication of this standard.

2) Published by: Department of Defense Industrial Supply Center, ATTN: DISC-BBEE, 700 Robbins Avenue, Philadelphia, PA 19111-5096 – USA.

3 Specimen requirements

Cables to be tested shall be of traceable origin and shall have passed the high voltage dielectric test defined in the product standard.

4 Preparation of specimen

4.1 Cut seven separate lengths of approximately 0,5 m consecutively from one length of cable, and strip each of the ends of insulation to permit electrical connection. Clean each length of cable with a clean cloth moistened with propan-2-ol (isopropyl alcohol) fluid.

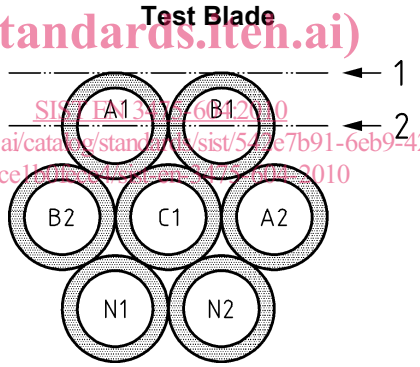
4.2 Lay up the seven cables as follows:

a) Form the cables in a six around one configuration as shown in Figure 1.

b) Ensure that all cables are straight and geometrically parallel, and restrained by ties such that they are in continuous contact for at least a 75 mm continuous length around the mid point of the loom length. This is called the test zone.

c) Position the ties at 15 mm to 20 mm spacing within the test zone. The tie material shall be PTFE glass lacing tape conforming to A-A-52083, type IV, finish D, size 3.

d) Number the cables as shown in Figure 1 such that the cables in contact with the blade are numbers A1 and B1.



Key

1 Original position

2 Final position

A1-A2: Phase A

B1-B2: Phase B

C1-C2: Phase C

N1-N2: Inactive cables connected to earth

Figure 1 — Specimen configuration

5 Apparatus

5.1 Electrical equipment

Connect the seven cables of the test sample within a circuit as shown in Figure 2. This circuit shall have the following requirements:

a) The provision of adjustable levels of prospective fault currents for the five A, B and C cables and an electrical return path for the two N cables.

b) A three phase 115/200 V 400 Hz (115 Vac network) or 230/400 V 400 Hz (230 Vac network) star (Y) connected supply shall be derived from a dedicated rotary machine capable of sustaining the maximum prospective fault current given in Table 1 for at least sufficient time for circuit protection to operate. In any case the generator shall have a sufficient rating to provide these prospective fault currents.

c) 115 Vac or 230 Vac circuit breakers shall be single pole units rated at the values specified in Table 2. They shall have trip characteristics in accordance with EN 2350 or as required in the product specification.

NOTE 1 Reference of circuit breakers used should be recorded.

NOTE 2 In particular case, others ratings of thermal breaker protection could be employed in accordance with aircraft manufacturer rules.

d) The electrical power source shall be appropriately protected and it shall be established that no combination of test circuit events would activate this protection.

e) The ballast resistors shall be non-inductive and of appropriate power rating. Care shall be taken to position all laboratory wiring such that inductive effects are reduced to a practical minimum. Supply cables shall be as short as possible.

f) Cables A, B and C shall be connected to indication and open circuit detectors at entry into the grounded star point. These components shall limit the standing current to no more than 10 % of the circuit breaker rating.

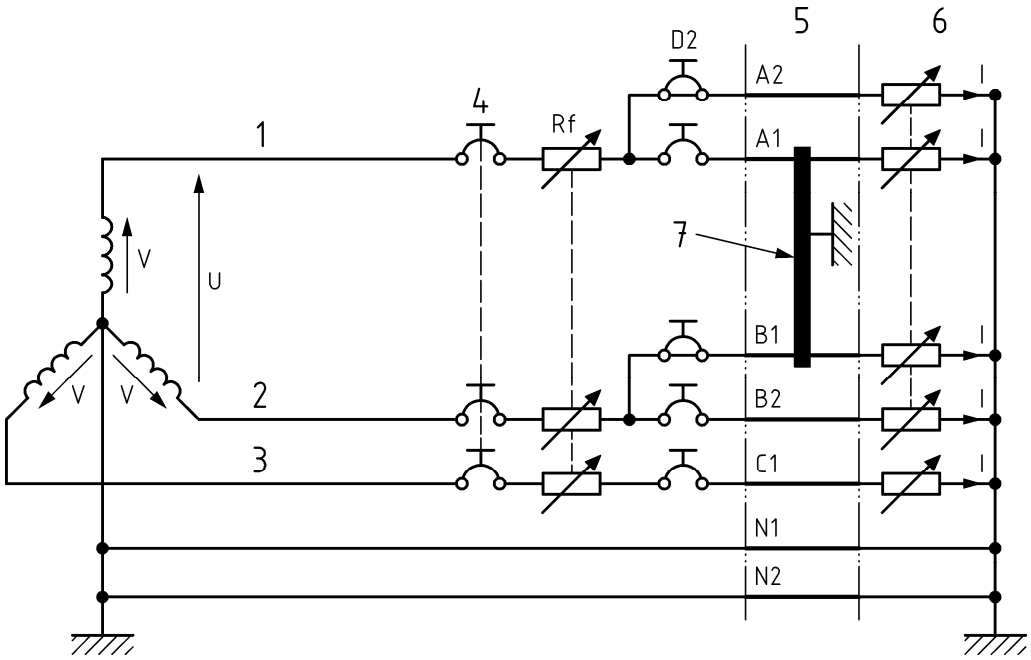
g) The automatic shut down facility shall provide, upon the detection of any open circuit during test and after a 10 s delay, removal of the blade from the specimen and for electrical power to be removed. Open circuit in this case means either a physical break in the specimen or a thermal breaker trip.

NOTE In the case of the automatic shut down facility is not used, the physical break in the specimen are detected by lamps in series with the rheostat Rg.

h) A heavy duty electrical bonding strap shall be connected between the blade of the test rig and the electrical star point of the generator.

i) Appropriate instrumentation, recording and switching control shall be installed in accordance with good laboratory practice.

j) A rheostat Rg adjusting current (**I**) in the circuit to a value equal to 10 % of the circuit breaker current.



Key

Rf Rheostat
1 Phase A
2 Phase B
3 Phase C
4 Supply protection
5 Test bundle
6 Indicators (lamp) + Rp
7 Test blade

Figure 2 — Test schematic circuit

5.2 Test equipment

Construct an apparatus as shown diagrammatically in Figures 3, 4 and 5 which includes the following minimum provisions:

a) A lightweight, freely pivoting test fixture to hold the blade at a 90° angle to the specimen and to exert a controlled force on the specimen.

NOTE Generally a mounting on 50 mm centres should hold the individual cables of the specimen in close proximity.

b) Electrical terminations to provide a ready means of connecting test specimens into the circuit as shown in Figure 2.

c) An aluminium blade complying with material specification T6061-T6 (EN 2702:2005) and Figure 5.

d) A mechanism to provide a minimum oscillating stroke of 15 mm excursion at a frequency of (8 ± 2) Hz.

e) A blade carrier to give a downward force at the blade of (2,5 ± 0,1) N.

f) A mechanical stop to limit the fall of the oscillating blade to within an accuracy of 0,2 mm measured at the point of contact.