SLOVENSKI STANDARD
SIST EN 3475-603:2004

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Aerospace series - Cables, electrical, aircraft use - Test methods - Part 603: Resistance to wet arc tracking

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Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 603: Lichtbogenfestigkeit, feucht

Série aérospatiale - Câbles électriques a usage aéronautique - Méthodes d'essais - Partie 603: Résistance a l'amorçage et a la propagation d'arc électrique, essai humide

Ta slovenski standard je istoveten z: EN 3475-603:2002

ICS:

49.060	Letalska in vesoljska elektriļ na oprema in sistemi	Aerospace electric equipment and systems

SIST EN 3475-603:2004 **en**

EUROPEAN STANDARD

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This European Standard was approved by CEN on 25 January 2002.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Ref. No. EN 3475-603:2002 E

Foreword

This document (EN 3475-603:2002) has been prepared by the European Association of Aerospace Manufacturers (AECMA).

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 AECMA, 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 December 2002, and conflicting national standards shall be withdrawn at the latest by December 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

1 Scope

This standard specifies a method for appraising the behaviour of cable insulation subjected to an electric arc initiated by a contaminating fluid.

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

The primary aim of this test is to produce, in a controlled fashion, failure effects which are representative of those which may occur in service when a typical cable bundle is damaged and subjected to aqueous fluid contamination such that electrical arcing occurs, both between cables and between cables and conductive structure.

Six levels of prospective fault current have been specified for cable sizes 26 to 10.

Individual product standards shall require at least sizes 24, 20, 14 cable to be assessed.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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
EN 2350	Aerospace series – Circuit breakers – Technical specification
MIL-T-43435-B	Specification for tape lacing and tying [1)]

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 fluid.
Damage two of the lengths of cable by inflicting a cut around the total circumference at the mid point of the length, taking care to ensure that the cut penetrates to the conductor around the full circumference and has a width of 0,5 mm to 1,0 mm.

1) Published by: Department of Defense (DOD), The Pentagon, Washington D.C. 20301 USA.

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) Displace the damaged cables longitudinally such that a separation of (10 ± 0,5) mm of undamaged insulation is provided. This is called the test zone.

c) Ensure that all cables are straight and geometrically parallel, and restrained by ties such that they are in continuous contact at least within the test zone.

d) Position the ties (4 ± 1,0) mm away from each side of the test zone and then at 15 mm to 20 mm spacing toward the ends of the specimen as shown in figure 2.

NOTE The tie material shall be PTFE glass lacing tape conforming to MIL-T-43435-B type IV, finish D size 3.

e) Number the cables as shown in figure 1 such that the faulted cables are numbers A1 and B1 and the centre cable is number N. Cables C1, A2, B2 and C2 are grouped around N.

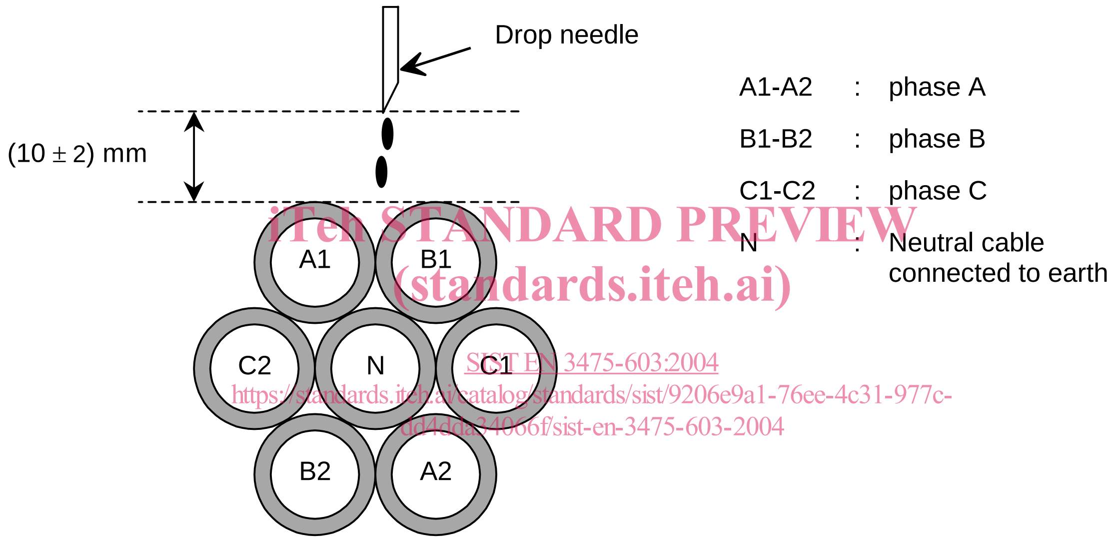

Figure 1 – Specimen configuration

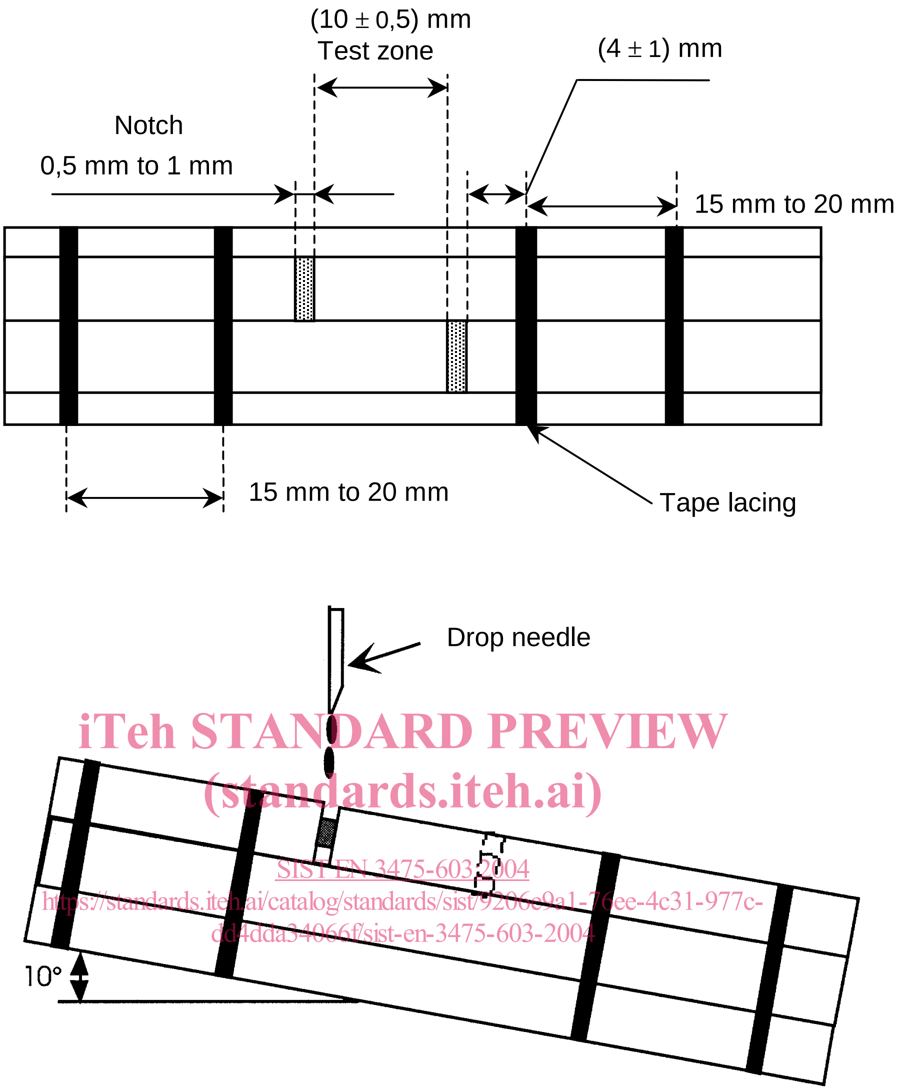

Figure 2 – Test configuration

5 Apparatus

5.1 Electrical equipment

Connect the seven cables of the test sample within a circuit as shown in figure 3. This circuit shall have the following requirements:

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

b) A three phase 208/115 V 400 Hz 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 1 min rating of not less than 15 kVA.

c) Circuit breakers shall be rated as given in table 2 and shall be single pole units. They shall have trip characteristics in accordance with EN 2350 or as required in the product specification.

NOTE In particular cases, 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 power and inhibition of further electrolyte application. Open circuit in this case means either a physical break in the specimen or a thermal breaker trip.

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

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

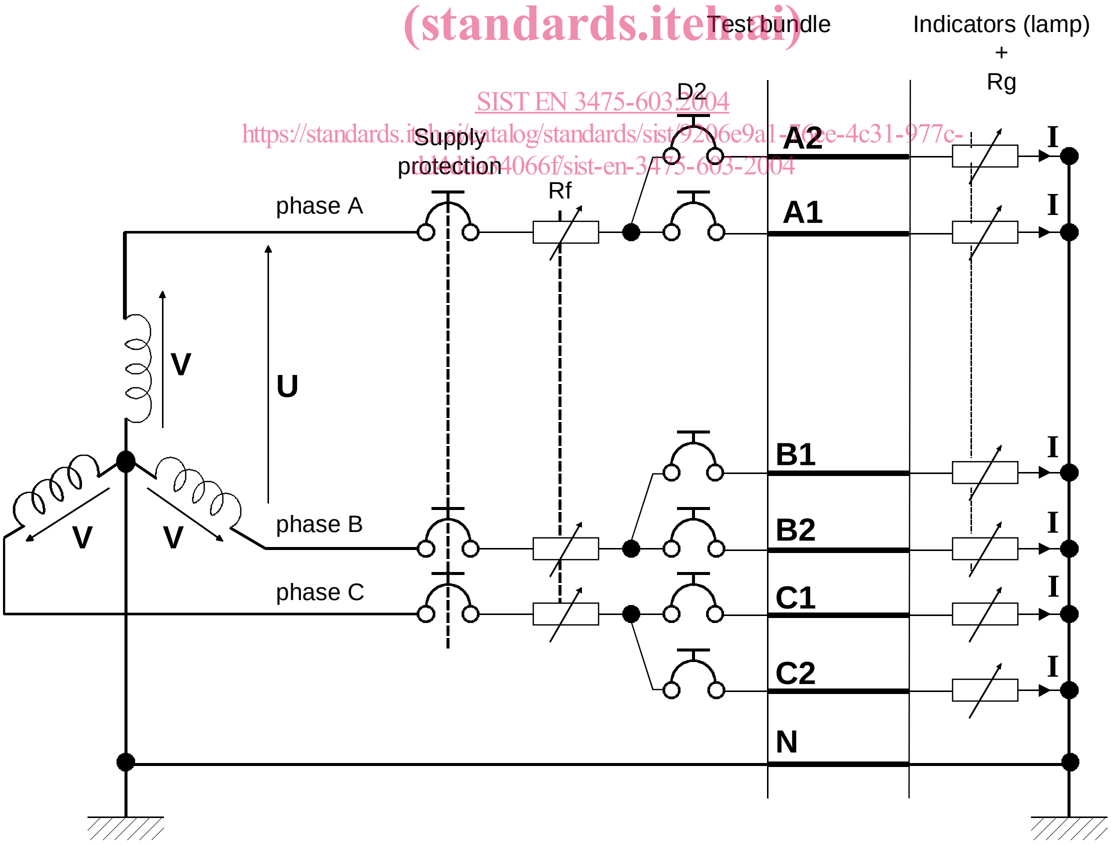

Figure 3 – Test schematic circuit

5.2 Test equipment

Construct an apparatus as shown diagrammatically in figure 2 which includes the following minimum provisions:

a) Electrical terminations to provide a ready means of connecting test specimens into the circuit as shown in figure 3.

b) A transparent enclosure to protect personnel from ejected molten metal and short wavelength ultra violet light.

c) An electrolyte delivery system which provides a constant rate of (100 ± 10) mg/min and dispenses drops from an 18 gauge needle, cut of square at the outlet.

NOTE The needle wall thickness shall be selected such that the specified flow rate shall be delivered at approximately 6 drops/min.

5.3 Test protocol

5.3.1 The procedure embraces cables sizes 26 to 10, and for each cable size six values of prospective fault current have been defined. Performance of a cable size at a given fault intensity shall be determined by testing three samples. Thus 18 samples are required for every cable size.

5.3.2 For the purposes of cable qualification at least sizes 24, 20 and 14 shall be tested. Additional testing of other sizes may be deemed necessary in particular cases and values of prospective fault currents, the ratings of thermal breaker protection which are typical of aircraft use have been included in this specification.

5.3.3 It is emphasised that electrical arcing tests are essentially destructive and can be hazardous to personnel. Therefore tests shall be undertaken with all observers shielded from direct physical and visual exposure as noted in 5.2 b). The use of video recording for all tests is required.

5.4 Test rig set-up

5.4.1 Install the rating of circuit breaker appropriate to the cable size to be tested (table 2).

5.4.2 Heavy duty electrical shorting connections shall be fitted in substitution of a test sample to enable prospective fault currents to be set by adjustment of resistances Rf. Because these currents would trip the thermal breakers very rapidly these shall be shunted to permit the pulsing of current until the desired value is obtained. Re-instate the thermal protection.

5.4.3 Prepare a solution in distilled or de-ionized water of 2 % by mass of ammonium chloride and (0,1 ± 0,01) % by mass of isooctylphenolpolyethoxyethanal, the polyethoxy chain to contain approximately 10 ethoxy units (triton x-100). Exceptionally, in the circumstances given in 6.1.2, the surfactant may be changed to ammonium perfluoroalkane carboxylate, e.g. 3M FC 126 or FC 143, at a concentration of (0,1 ± 0,01) % by mass.

5.4.4 Support the specimen in free air inclined at an angle of 10° to the horizontal with the electrical input connections at the higher end and with the cables forming the test zone uppermost.

5.4.5 Position the delivery system so that the electrolyte contacts the loom from a height of (10 ± 2) mm above the uppermost cables in the loom at a point which shall position the droplets into the upper cut or no more than 2 mm towards the higher end of the specimen. Ensure that the drops strike the cables at the top centre of the circumference such that they fall into the crevice between cables A1 and B1.