SLOVENSKI STANDARD
SIST EN 3745-603:2008

01-september-2008

Aeronavtika - Optiļ na vlakna in kabli za uporabo v zraļ nih plovilih - Preskusne metode - 603. del: Jedrsko sevanje

Aerospace series - Fibres and cables, optical, aircraft use - Test methods - Part 603: Nuclear radiation

Luft- und Raumfahrt - Faseroptische Leitungen für Luftfahrzeuge - Prüfverfahren - Teil 603: Nukleare Bestrahlung

Série aérospatiale - Fibres et câbles optiques à usage aéronautique - Méthodes d'essais - Partie 603: Rayonnement nucléaire

Ta slovenski standard je istoveten z: **EN 3745-603:2008**

ICS:

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

SIST EN 3745-603:2008 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3745-603

May 2008

ICS 49.060

English Version

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Ref. No. EN 3745-603:2008: E

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Foreword

This document (EN 3745-603:2008) 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of an identical text or by endorsement, at the latest by November 2008, and conflicting national standards shall be withdrawn at the latest by November 2008.

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1 Scope

This standard specifies a method to determine the effects of nuclear radiation on the transmission capability of an optical fibre or cable.

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 2591-100, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 100: General.*

EN 3745-100, *Aerospace series — Fibres and cables, optical, aircraft use — Test methods — Part 100: General.*

EN 3745-301, *Aerospace series — Fibres and cables, optical, aircraft use — Test methods — Part 301: Attenuation.*

3 Preparation of specimens

3.1 If not at standard test conditions, the specimens shall be subjected to standard test conditions and stabilized at these conditions for 24 h as defined in EN 3745-100.

3.2 The following details shall be specified if not already included in the product standard:

- The number of specimens;
- The length of the optical fibre/cable under test; generally (500 ± 10) m for background radiation, 100 m adverse nuclear environment;
- Maximum permissible variation in attenuation;
- The temperature at which test is carried out;
- Measurement intervals;
- Type of the source if not of Co^{60};
- Severity.

4 Apparatus

Following apparatus is required:

- Light launch system (LLS) and detection systems (LDS) as defined in EN 2591-100.
- A recording unit shall permit a continuous power measurement during the exposure time.
- Optical splitter:
  An optical splitter or a fibre optic coupler may divert a small portion of the input power to a reference detector. The reference path shall be used to monitor system fluctuation for the duration of the test.
- Radiation source:
  Two radiation sources are described; one for background radiation (method A) and one for adverse nuclear environment (method B).
  - *Method A:* A Co^{60} or equivalent ionising source providing a rate of 20 rad/h should be used.

— *Method B:* A Co^{60} or equivalent ionising source providing a desired dose rate ranging from 5 rad/s to 250 rad/s should be used.

— Radiation dosimeter:
Thermoluminescent LiF or CaF crystal detectors (TLDs) shall be used to measure the total radiation dose received by the specimen fibre/fibre cable.

— Temperature controlled container:
Unless otherwise specified, the temperature controlled container shall have the capability of maintaining the specified temperature to within ± 2 °C.

5 Method

5.1 Calibration of radiation source

Calibration of the radiation source for dose uniformity and level shall be made prior to placing the device under test (DOT) in the chamber. Four TLDs shall be placed in the area of exposure. The readings of the multiple TLDs at each location shall be averaged to minimise dose uncertainties.

If a fibre reel is used, the variation in dose across its volume should not exceed ± 10 %.

5.2 Method A: Environmental back ground radiation test

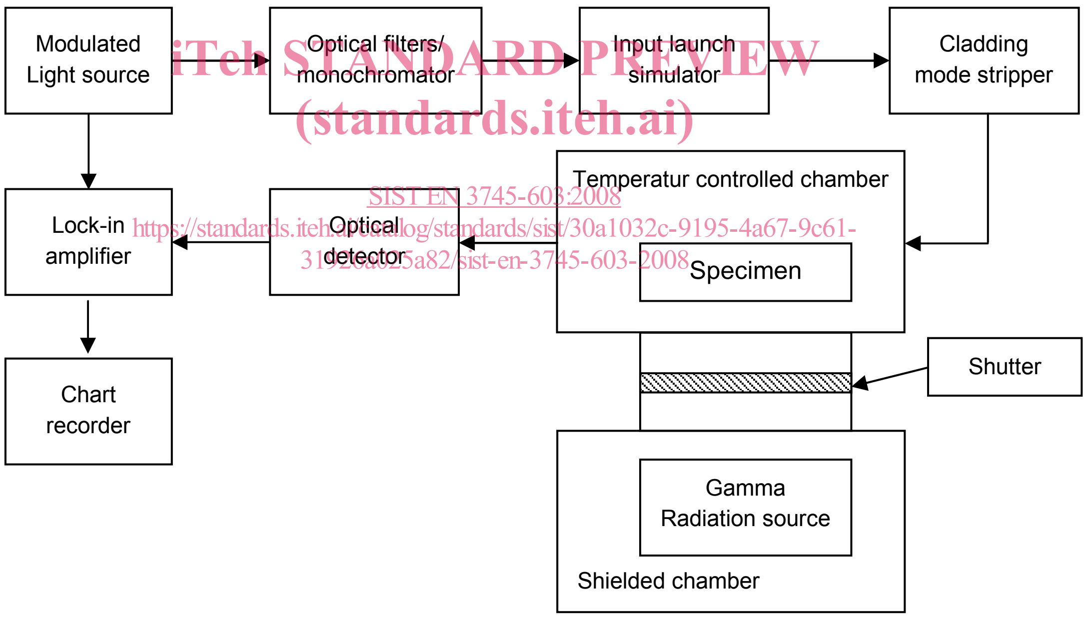

Figure 1 — Testing configuration

Place the specimen in the test chamber and connect it to the LLS and LDS and obtain a reference attenuation measurement in accordance with EN 3745-301 Method C. Unless otherwise specified, expose the specimen to a minimum total dose of at least 100 rad.

Upon completion, and within 2 h of the irradiation process, an attenuation measurement of the specimen in accordance with EN 3745-301 Method C shall be performed.

The test shall be carried out once for each requested test temperature and wavelength.

5.3 Method B: Adverse nuclear environment

Testing configuration: See Figure 1.

Place the specimen in the test chamber and connect it to the LLS and LDS and obtain a reference attenuation measurement in accordance with EN 3745-301 Method C. Unless otherwise specified, expose the specimen to at least one of the dose rate and total dose level combination specified in the Table 1.

Table 1 — Total dose/dose rate combinations

Severity	Total dose Sievert	Dose rate Rad/s
1	3 000	5
2	10 000	50
3	100 000	200
4	1 000 000	200

Dose rate levels are only approximate levels since the radiation source characteristics change.

The output power from the specimen shall be recorded for the duration of the gamma irradiation cycle. The power shall also be recorded for at least 15 min after completion of the irradiation process in accordance with EN 3745-301 Method C, if not otherwise specified.

The process shall be carried out once for each requested test temperature and wavelength, it will be necessary to use a new non-irradiated specimen for each temperature required.

5.4 Measurements and requirements

Attenuation, during the test, should be within that specified.

After completion of irradiation the following test shall then be carried out:

— EN 3745-301, Attenuation Method C, maximum change in attenuation shall be within that specified.