SLOVENSKI STANDARD
SIST EN 3745-410:2015

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Nadomešča:
SIST EN 3745-410:2007

Aeronavtika - Optična vlakna in kabli za uporabo v zračnih plovilih - Preskusne metode - 410. del: Življenjska doba pod temperaturnim vplivom

Aerospace series - Fibres and cables, optical, aircraft use - Test methods - Part 410: Thermal life

Luft- und Raumfahrt - Faseroptische Leitungen für Luftfahrzeuge - Prüfverfahren - Teil 410: Lebensdauer unter Temperatureinwirkung

Série aérospatiale - Fibre et câbles optiques à usage aéronautique - Méthodes d'essais - Partie 410 : Durée de vie en température

Ta slovenski standard je istoveten z: **EN 3745-410:2015**

ICS:

33.180.10	(Optična) vlakna in kabli	Fibres and cables
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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EUROPEAN STANDARD

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English Version

Aerospace series - Fibres and cables, optical, aircraft use - Test methods - Part 410: Thermal life

Série aérospatiale - Fibre et câbles optiques à usage aéronautique - Méthodes d'essais - Partie 410 : Durée de vie en température

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This European Standard was approved by CEN on 14 February 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

European foreword

This document (EN 3745-410:2015) 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of an identical text or by endorsement, at the latest by January 2016 and conflicting national standards shall be withdrawn at the latest by January 2016.

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This document supersedes EN 3745-410:2007.

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1 Scope

This European Standard specifies a method of measuring the thermal endurance of a finished optical cable. There are two test methods incorporated which estimate the cables thermal life with or without the mechanical stress.

— Method A – without mechanical stress (temperature only),

— Method B – combined temperature and mechanical stress.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

ASTM-D3032, *Standard test methods for hookup wire insulation* [1)]

3 Test specimens

3.1 Fibre ends

The fibre ends shall be prepared in accordance with EN 2591-100.

If not yet 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.

4 Method A (without mechanical stress applied)

4.1 Preparation of test specimens

Specimens have to be fixed on an apparatus representative of aircraft installation. Ten specimens are fixed on apparatus and constitute a set for life testing at each temperature. A minimum of four sets of specimens is necessary.

1) Published by: ASTM National (US) American Society for Testing and Materials (http://www.astm.org/).

4.2 Test conditions

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

— Type of fibre/cable from which the specimens were taken,

— Type/number/pitch of clamps

— Minimum authorized long term bend radius

— Length of specimens if not 10 m

— Maximum permissible variation in attenuation if not −3 dB

— Temperature values ($\theta 1 > \theta 2 > \theta 3 > \theta 4$)

4.3 Apparatus

The apparatus shall comprise:

— A Light Launch System (LLS) as defined in EN 2591-100,

— A split coupler 1 × 10,

— A Light Detection System (LDS) as defined in EN 2591-100, with 10 channel recorder,

— A fixture to secure the specimens,

— A climatic chamber capable of temperature control of ± 2 °C.

4.4 Procedure

4.4.1 Initial measurements

If the value of the highest temperature value is not specified in the product standard make a quick estimation of the highest test temperature with one specimen during 24 h at 80 °C above the nominal rating temperature.

The variation in attenuation shall not exceed the specified value.

4.4.2 Test

The attenuation shall be monitored throughout the test in accordance with EN 3745-301, method C.

Connect the specimen ends to the coupler, the coupler to LLS and the other specimen ends to LDS.

Place the fixture in the test chamber. The coupler and connectors shall not be into climatic chamber.

Begin the test sequence with the highest test temperature ($\theta 1$) since exposure times will be relatively short.

Record the exposure time to failure for each specimen. A failure is defined when the variation in attenuation is higher than the specified value.

Stop the test sequence when all specimens in group have failed.

Calculate the log average life as defined in ASTM-D3032. If the log average life at this temperature (highest) is found to be less than 100 h, too high a test temperature has been selected and these data should be discarded. Tests should be repeated at lower temperature.

Repeat this procedure with the group N° 2 of specimens for $\theta 2$ temperature value.

Calculate the log average life as defined in ASTM-D3032.

Repeat this procedure with the group N° 3 of specimens for $\theta 3$ temperature value.

Calculate the log average life as defined in ASTM-D3032.

Repeat this procedure with the last group of specimens for $\theta 4$ temperature value (lowest).

Calculate the log average life as defined in ASTM-D3032. If the average life found at this test temperature is less than 5 000 h, this test will be made at lower temperature.

4.4.3 Final measurements and requirement

The calculation of average life and extrapolation are defined in the ASTM-D3032 — Standard test methods for hookup wire insulation.

4.4.4 Special precautions

Extrapolation to a temperature index expected at the selected end of life (10 000 h, 20 000 h or 40 000 h)

should not exceed 25 °C below the lowest aging test temperature.

— The log average life at the highest test temperature ($\theta 1$) shall not be less than 100 h.

— The log average life at the lowest test temperature ($\theta 4$) shall not be less than 5 000 h.

5 Method B (with mechanical stress applied)

5.1 Preparation of test specimens

One set for life testing shall consist of ten specimens fixed on the apparatus (Figure 1) at each temperature. A minimum of four sets of specimens is necessary. In order to reduce the variation of stress to the fibre the cable shall be attached to the test fixture by trapping it between two padded plates rather than using standard aircraft cable clamps.

5.2 Test conditions

Length of specimens 5 m.

Length of specimens within the test chamber 3 m.

Maximum permissible variation in attenuation if not 3 dB at 20 °C ± 3 °C and at 850 nm.

Launch conditions to be 85/85.

5.3 Information to be included in the product standard

— Type of fibre/cable from which the specimens were taken,

— Minimum long term bend radius (R),

— wave length if not 850 nm,

— Maximum permissible variation in attenuation if not 3 dB,

— Launch conditions if not 85/85.

5.4 Apparatus

The apparatus shall comprise:

— A Light Launch System (LLS) as defined in EN 2591-100,

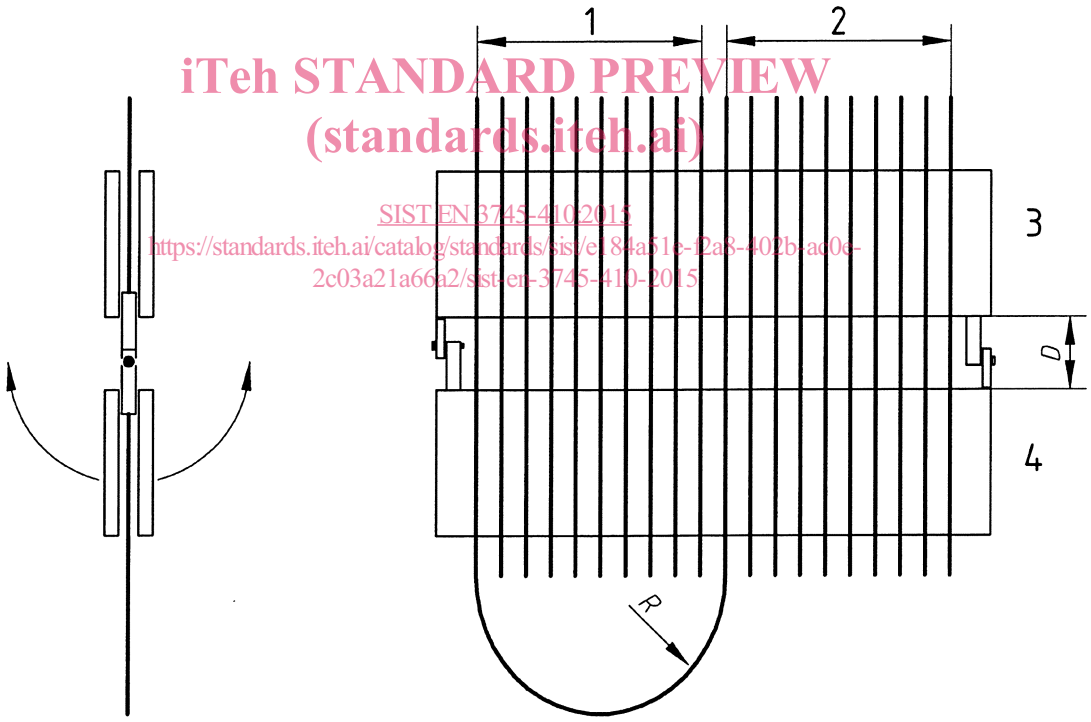
— A Light Detection System (LDS) as defined in EN 2591-100,

— A device allowing to connect the LLS to all specimen shall be used to focus the test on the ageing of cable,

— A device allowing measuring one of the specimens or all cable without disconnection shall be used in order to keep the baseline of initial measurement.

A test fixture is used to secure the specimens, this fixture shall be so designed that the cable is mounted so that it can be bent at 90° either side of its centre line and is free to freely follow a curve between the two clamp points that corresponds to it minimum bend radius ($D = 2R$). The test sample is to be so arranged that only the portion of the sample in the flexing area is stressed during the test. The fixtures corner is to be rounded and padded see Figure 1 and Figure 2.

A climatic chamber capable of temperature control of $\pm \theta 2$ °C.



Key

1 To the LLS
2 To the LDS
3 Fixed plate
4 Moving plate

D = is twice the cable minimum bend radius

R = not less than the minimum bend radius least

Figure 1 — Test Fixture