BS EN 2591-100:2024

BSI Standards Publication

Aerospace series — Elements of electrical and optical connection — Test methods

Part 100: General

Documents
Document Sharing Hub

Full document details: BS EN 2591-100:2024

National foreword

This British Standard is the UK implementation of EN 2591-100:2024. It supersedes BS EN 2591-100:2018, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2024
Published by BSI Standards Limited 2024

ISBN 978 0 539 21677 6

ICS 49.060; 49.090

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2024.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN 2591-100:2024

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 2591-100

October 2024

ICS 49.060; 49.090

Supersedes EN 2591-100:2018

English Version

Aerospace series - Elements of electrical and optical connection - Test methods - Part 100: General

Série aérospatiale - Organes de connexion électrique et optique - Méthodes d'essais - Partie 100 : Généralités

Luft- und Raumfahrt - Elektrische und optische Verbindungselemente - Prüfverfahren - Teil 100: Allgemeines

This European Standard was approved by CEN on 3 June 2024.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2024 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 2591-100:2024 E

Documents
Document Sharing Hub

Full document details: BS EN 2591-100:2024

Contents

Page

European foreword 3
1 Scope 4
2 Normative references 4
3 Terms and definitions 5
4 Standard test conditions 9
5 Test main requirements 9
5.1 Fibre end preparation 9
5.1.1 General 9
5.1.2 Parameters 9
5.1.3 Methods 13
5.1.4 Specimen examination and acceptance 13
5.1.5 Termination cleaning 14
5.2 Light Launch System (LLS) 14
5.2.1 General 14
5.2.2 Generating the correct launch conditions 15
5.2.3 Launch conditions specification for 62,5 µm/125 µm fibres and cables (NA = 0,275) 16
5.2.4 Launch conditions specification for 50 µm/125 µm fibres and cables (NA = 0,2) 19
5.3 Light Detection System (LDS) 21
5.3.1 General 21
5.3.2 Method 22
5.3.3 Special precautions 22
5.3.4 Documentation 22
6 List of test methods 23
7 Test report 27
Bibliography 28

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024

European foreword

This document (EN 2591-100:2024) has been prepared by ASD-STAN.

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2025, and conflicting national standards shall be withdrawn at the latest by April 2025.

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

This document supersedes EN 2591-100:2018.

The main changes with respect to the previous edition are as follows:

— EN 2591-100 (P2), 08/2018:

  - update of the test requirements for fibre end preparation and light launch conditions for various sizes and types of fibres;
  - addition of new test requirements for light detection systems.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this document: 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024

1 Scope

This document specifies the general requirements for the methods of testing elements of electrical, optical and data transmission system connections used in aerospace applications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2083, *Aerospace series — Copper or copper alloys conductors for electrical cables — Product standard*

EN 2084, *Aerospace series — Cables, electrical, general purpose, with conductors in copper or copper alloy — Technical specification*

EN 2234, *Aerospace series — Cables, electrical, fire-resistant — Technical specification*

EN 2346,[1] *Aerospace series — Fire resistant electrical cables — Dimensions, conductor resistance and mass*

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

EN 3745-201, *Aerospace series — Fibres and cables, optical, aircraft use — Test methods — Part 201: Visual examination*

EN 4641-100, *Aerospace series — Cables, optical 125 µm diameter cladding — Part 100: Tight structure 62,5/125 µm core GI fibre 1,8 mm outside diameter — Product standard*

EN 4641-301, *Aerospace series — Cables, optical 125 µm diameter cladding — Part 301: Tight structure 50/125 µm GI, fibre nominal 1,8 mm outside diameter — Product standard*

EN 60793-1-43, *Optical fibres — Part 1-43: Measurement methods and test procedures — Numerical aperture measurement* (IEC 60793-1-43)

EN IEC 60512-1, *Connectors for electronic equipment — Tests and measurements — Part 1: General* (IEC 60512-1:2001)

EN IEC 60793-1-45, *Optical fibres — Part 1-45: Measurement methods and test procedures — Mode field diameter* (IEC 60793-1-45)

IEC 60050-581, *International Electrotechnical Vocabulary — Part 581: Electromechanical components for electronic equipment*

[1] Published as ASD-STAN prEN at the date of publication of this document, available at: https://www.asd-stan.org/.

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581, EN IEC 60512-1 and EN 3745-100 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

NOTE For the following terms, see EN 3745-100: optical fibre – core – cladding – fibre coating – refractive index profile – core diameter – cladding diameter – concentricity error core/cladding – non circularity of core – non circularity of cladding – attenuation – numerical aperture – bandwidth

3.1
element of electrical or optical connection
component the purpose of which is to ensure the connection of circuits

EXAMPLE Connector, module.

Note 1 to entry: In test standards, the term "element of connection" shall be used.

3.2
flight cover
protective cover
accessory designed to ensure, in flight, mechanical protection and sealing of front face of a non-coupled connector

3.3
connector with built-in protection of contacts
connector with characteristics such that male or female contacts, mounted in a plug or receptacle, cannot come into contact with the front of the connector to which it is coupled (scoop-proof) and in which, in the event of accidental coupling of two parts or the connector equipped with male contacts, no electrical contact can take place

3.4
contact pressure point
point at which a square ended gauge pin of the same basic diameter as the mating contact first engages the female contact spring member

3.5
initial measurement
examination or measurement of characteristics carried out to determine the magnitude of the variations produced by the stress or stresses applied

Note 1 to entry: This examination or measurement is carried out at the end of pre-conditioning and under normal atmospheric conditions for measuring.

3.6
final measurement
examination or measurement of characteristics carried out at the end of the recovery to assess the condition of the specimen after testing and to determine the magnitude of the variations in characteristics in relation to the values recorded at initial measuring

AVA Documents
Document Sharing Hub

Full document details: BS EN 2591-100:2024

3.7
flammability
characteristic of a product which shows resistance when exposed for a given duration to a standard external flame, combustion remains localized and stops spontaneously after withdrawal of the flame

3.8
fire resistance
characteristic of a product which, when subjected to a standard flame:

— retains its electrical role for six minutes;

— the flame does not propagate to the other side of the support in the first twenty minutes

3.9
values of alternating voltage and current
unless otherwise indicated, alternating voltage and current are indicated in root mean square values

3.10
data bus line
pair of twisted wires, shielded, having a specified impedance, a matched impedance at its two ends and used for data transport

3.11
branch line
section of twisted wires, shielded, with a specified impedance, which connects equipment to a bus line

3.12
line coupler
element of electrical or optical connection the purpose of which is to shunt the transmission signals from a bus line to equipment

3.13
line coupler, single
coupler consisting of one line and one branch

3.14
line coupler, double
coupler consisting of one line and two branches

3.15
in-line splice
permanent element of electrical or optical connection for two-wire cables

3.16
line termination
end line component the purpose of which is to match the bus line to its characteristic impedance

3.17
branch termination
end branch termination the purpose of which is to eventually replace equipment

3.18
recovery
treatment of a specimen, after conditioning, so that the properties of the specimen may be stabilized before measuring

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024

3.19
optical fibre cable
certain number of optical fibres or bundles, coated separately and joined inside a common sheath

3.20
beam splitter
device for dividing an optical beam into two separate beams

3.21
insertion loss
<of an optical element> extra optical attenuation caused by the insertion of an extra optical element into an optical system

3.22
launch angle
angle between the wave propagation vector of the incoming light and the normal vector of an optic fibre end face

3.23
mode conditioner
device for adapting the light output from a source to produce a defined launch condition for testing an optical system

3.24
multimode fibre
optical fibre having a large core diameter dimension in relation to the wavelength of the light, and in which a large number of modes can propagate

3.25
optical port
port which radiates or accepts optical power at the interface

3.26
fibre optic branching device
device possessing three or more optical ports which shares optical power among its ports in a predetermined fashion

3.27
patch cord
assembly where the cable or fibre is terminated at each end with either a plug or socket connector

3.28
pigtail
short length of fibre between a component and a transmission fibre

Note 1 to entry: It is often permanently secured to the component.

EXAMPLE LED, coupler, connection elements.

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024

3.29
power meter
device for measuring the optical power in a fibre optic system

Note 1 to entry: Power measurements are usually made in Watts or dBm. Relative power measurements are made in dB.

3.30
single mode fibre
optical fibre in which only one mode can propagate

3.31
passive coupler
passive branching device in which power from one or more incoming optical ports is distributed to one or more outgoing optical ports

3.32
tee coupler
passive coupler or combiner with three optical ports

3.33
return loss
light energy reflected back from discontinuities in a fibre optic link

3.34
light launch system
LLS
device designed to create defined and repeatable light coupling conditions in a test setup

3.35
light detection system
LDS
device designed to take repeatable measurements of light transmitted by a test setup

3.36
temporary joint
non-permanent optical fibre connecting device for use on equipment

3.37
terminator
non-reflective termination of an optical fibre

3.38
test cord
terminated optical fibre cord used to connect the test equipment to the optical span, or to provide suitable interfaces to the cabling under test

Documents
Document Sharing Hub
Full document details: BS EN 2591-100:2024