SLOVENSKI STANDARD
SIST EN IEC 61757-1-1:2020

01-julij-2020

Nadomešča:
SIST EN 61757-1-1:2017

Optični senzorji - 1-1. del: Merjenje deformacij - Zaznavala deformacij na podlagi vlakenske Braggove uklonske mrežice (IEC 61757-1-1:2020)

Fibre optic sensors - Part 1-1: Strain measurement - Strain sensors based on fibre Bragg gratings (IEC 61757-1-1:2020)

Lichtwellenleitersensoren - Teil 1-1: Dehnungsmessungen - Dehnungssensoren basierend auf Faser-Bragg-Gitter (IEC 61757-1-1:2020)

Capteurs à fibres optiques - Partie 1-1: Mesure de déformation - Capteurs de déformation basés sur des réseaux de Bragg à fibres (IEC 61757-1-1:2020)

Ta slovenski standard je istoveten z: **EN IEC 61757-1-1:2020**

ICS:

33.180.99	Druga oprema za optična vlakna	Other fibre optic equipment

SIST EN IEC 61757-1-1:2020 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61757-1-1

May 2020

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Supersedes EN 61757-1-1:2017 and all of its amendments and corrigenda (if any)

English Version

Fibre optic sensors - Part 1-1: Strain measurement - Strain sensors based on fibre Bragg gratings (IEC 61757-1-1:2020)

Capteurs fibroniques - Partie 1-1: Mesure de déformation - Capteurs de déformation basés sur des réseaux de Bragg à fibres (IEC 61757-1-1:2020)

Lichtwellenleitersensoren - Teil 1-1: Dehnungsmessungen - Dehnungssensoren basierend auf Faser-Bragg-Gitter (IEC 61757-1-1:2020)

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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 CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

Ref. No. EN IEC 61757-1-1:2020 E

European foreword

The text of document 86C/1642/FDIS, future edition 2 of IEC 61757-1-1, prepared by SC 86C "Fibre optic systems and active devices" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61757-1-1:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-02-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-05-01

This document supersedes EN 61757-1-1:2017 and all of its amendments and corrigenda (if any).

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

Endorsement notice

The text of the International Standard IEC 61757-1-1:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60793-1-30	NOTE	Harmonized as EN 60793-1-30
IEC 60793-1-31	NOTE	Harmonized as EN IEC 60793-1-31
IEC 60793-1-33	NOTE	Harmonized as EN 60793-1-33
ISO 527-4	NOTE	Harmonized as EN ISO 527-4
ISO 7500-1	NOTE	Harmonized as EN ISO 7500-1
ISO 14125	NOTE	Harmonized as EN ISO 14125

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050	series	International Electrotechnical Vocabulary	-	-
IEC 60068-2	series	Environmental testing - Part 2: Tests	EN 60068-2	series
IEC 60793-2	-	Optical fibres - Part 2: Product specifications - General	EN IEC 60793-2	-
IEC 60793-2-50	-	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	EN IEC 60793-2-50	-
IEC 61300-2	series	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2: Tests	EN 61300-2	series
IEC 61754	series	Fibre optic interconnecting devices and passive components - Fibre optic connector interfaces	EN 61754	series
IEC 61757	-	Fibre optic sensors - Generic specification	EN IEC 61757	-
IEC/TR 61931	-	Fibre optic - Terminology	-	-
IEC 62129-1	-	Calibration of wavelength/optical frequency measurement instruments - Part 1: Optical spectrum analyzers	EN 62129-1	-
IEC 62129-2	-	Calibration of wavelength/optical frequency measurement instruments - Part 2: Michelson interferometer single wavelength meters	EN 62129-2	-
IEC 62129-3	-	Calibration of wavelength/optical frequency measurement instruments - Part 3:Optical frequency meters internally referenced to a frequency comb	EN IEC 62129-3	-

Publication	Year	Title	EN/HD	Year
ISO/IEC Guide 99	-	International vocabulary of metrology - Basic and general concepts and associated terms (VIM)	-	-

IEC 61757-1-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Fibre optic sensors –
Part 1-1: Strain measurement – Strain sensors based on fibre Bragg gratings

Capteurs fibroniques –
Partie 1-1: Mesure de déformation – Capteurs de déformation basés sur des réseaux de Bragg à fibres

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FIBRE OPTIC SENSORS –

Part 1-1: Strain measurement – Strain sensors based on fibre Bragg gratings

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61757-1-1 has been prepared by subcommittee SC 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

This edition includes the following technical changes with respect to the previous edition:

a) update of cited standards;
b) clarification of definitions and test specifications.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
86C/1642/FDIS	86C/1650/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61757 series, published under the general title *Fibre optic sensors*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The IEC 61757 series is published with the following logic: the sub-parts are numbered as IEC 61757-*M*-*T*, where *M* denotes the measure and *T*, the technology.

FIBRE OPTIC SENSORS –

Part 1-1: Strain measurement – Strain sensors based on fibre Bragg gratings

1 Scope

This part of IEC 61757 defines detail specifications for fibre optic sensors using one or more fibre Bragg gratings (FBG) as the sensitive element for strain measurements. Generic specifications for fibre optic sensors are defined in IEC 61757.

This document specifies the most important features and characteristics of a fibre optic sensor for strain measurements, based on use of an FBG as the sensitive element, and defines the procedures for their determination. Furthermore, it specifies basic performance parameters and characteristics of the corresponding measuring instrument to read out the optical signal from the FBG. This document refers to the measurement of static and dynamic strain values in a range of frequencies.

A blank detail specification is provided in Annex B.

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.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at www.electropedia.org)

IEC 60068-2 (all parts), *Environmental testing – Part 2: Tests*

IEC 60793-2, *Optical fibres – Part 2: Product specifications – General*

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 61300-2 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2: Tests*

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC 61757, *Fibre optic sensors – Generic specification*

IEC TR 61931, *Fibre optic – Terminology*

IEC 62129-1, *Calibration of wavelength/optical frequency measurement instruments – Part 1: Optical spectrum analyzers*

IEC 62129-2, *Calibration of wavelength/optical frequency measurement instruments – Part 2: Michelson interferometer single wavelength meters*

IEC 62129-3, *Calibration of wavelength/optical frequency measurement instruments – Part 3: Optical frequency meters internally referenced to a frequency comb*

ISO/IEC Guide 99, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61757, IEC 60050 (all parts), IEC TR 61931, ISO/IEC Guide 99 (VIM), and the following apply.

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

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

NOTE Long period gratings, non-uniform gratings, angled gratings, and FBG in polarization maintaining fibre are not considered.

3.1
fibre Bragg grating
FBG
phase diffraction grating integrated in optical single-mode silica-based fibres, according to category B of IEC 60793-2-50, to selectively reflect a very narrow range of wavelengths while transmitting others

Note 1 to entry: To achieve this characteristic, periodically spaced zones in the fibre core are altered to have different refractive indexes slightly higher than the core.

Note 2 to entry: This note applies to the French language only.

3.2
FBG strain sensor
device that uses one or more fibre Bragg gratings (3.1) as a sensitive element for strain measurements

Note 1 to entry: Different configurations are possible (see 5.2).

3.3
Bragg wavelength
λ_{Bref}
wavelength of the FBG (3.1), generally corresponding to the Bragg reflection peak or transmission minimum, without applied strain under reference ambient conditions

Note 1 to entry: If referred to as an FBG strain sensor (see 3.2), it refers to the configuration prior to its installation.

Note 2 to entry: λ_B is the wavelength of the FBG strain sensor indicated by the manufacturer without any further mechanical and ambient specification.

3.4
reference wavelength
λ_0
wavelength response of an FBG after installation or at the beginning of measurement to the affecting loading and ambient conditions