SLOVENSKI STANDARD
SIST EN 62129-1:2017

01-april-2017

Nadomešča:
SIST EN 62129:2006

Umerjanje valovno-dolžinskih/optično-frekvenčnih merilnih instrumentov - 1. del: Analizatorji optičnega spektra (IEC 62129-1:2016)

Calibration of wavelength/optical frequency measurement instruments - Part 1: Optical spectrum analyzers (IEC 62129-1:2016)

Ta slovenski standard je istoveten z: EN 62129-1:2016

ICS:

17.180.30	Optični merilni instrumenti	Optical measuring instruments
33.180.01	Sistemi z optičnimi vlakni na splošno	Fibre optic systems in general

SIST EN 62129-1:2017 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62129-1

June 2016

ICS 33.140; 33.180.01

Supersedes EN 62129:2006

English Version

Calibration of wavelength/optical frequency measurement instruments - Part 1: Optical spectrum analyzers (IEC 62129-1:2016)

Étalonnage des appareils de mesure de longueur d'onde/appareil de mesure de la fréquence optique - Partie 1: Analyseurs de spectre optique (IEC 62129-1:2016)

Kalibrierung von Messgeräten für die Wellenlänge/optische Frequenz - Teil 1: Optische Spektrumanalysatoren (IEC 62129-1:2016)

This European Standard was approved by CENELEC on 2016-02-17. CENELEC 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.

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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: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 62129-1:2016 E

European foreword

The text of document 86/477/CDV, future edition 1 of IEC 62129-1, prepared by IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62129-1:2016.

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) 2016-12-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-06-03

This document supersedes EN 62129:2006.

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Endorsement notice

The text of the International Standard IEC 62129-1:2016 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 60793-2-50	NOTE	Harmonized as EN 60793-2-50.
IEC 61315	NOTE	Harmonized as EN 61315.
IEC 62129-2	NOTE	Harmonized as EN 62129-2.
IEC 62522	NOTE	Harmonized as EN 62522.
IEC 60359:2001	NOTE	Harmonized as EN 60359:2002 (not modified).
IEC 61290-3-1	NOTE	Harmonized as EN 61290-3-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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 60050-731	-	International Electrotechnical Vocabulary - Chapter 731: Optical fibre communication	-	-
IEC 60793-2	series	Optical fibres - Part 2: Product specifications	EN 60793-2	series
IEC 60825-1	-	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	-
ISO/IEC 17025	-	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	-
ISO/IEC Guide 98-3	2008	Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)	-	-

IEC 62129-1

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Calibration of wavelength/optical frequency measurement instruments – Part 1: Optical spectrum analyzers

Étalonnage des appareils de mesure de longueur d'onde/appareil de mesure de la fréquence optique – Partie 1: Analyseurs de spectre optique

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CALIBRATION OF WAVELENGTH/OPTICAL FREQUENCY MEASUREMENT INSTRUMENTS –

Part 1: Optical spectrum analyzers

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 62129-1 has been prepared by IEC technical committee 86: Fibre optics.

This first edition of IEC 62129-1 cancels and replaces the first edition of IEC 62129, published in 2006. This edition constitutes a technical revision.

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

a) update of term and definitions;
b) update of calibration conditions;
c) calculation change of uncertainties related to wavelength temperature dependence, power linearity, power level temperature dependence;
d) move of Annex E to the bibliography.

The text of this standard is based on the following documents:

CDV	Report on voting
86/477/CDV	86/483/RVC

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

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

A list of all parts in the IEC 62129 series, published under the general title *Calibration of wavelength/optical frequency measurements instruments*, can be found on the IEC website.

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

CALIBRATION OF WAVELENGTH/OPTICAL FREQUENCY MEASUREMENT INSTRUMENTS –

Part 1: Optical spectrum analyzers

1 Scope

This part of IEC 62129 specifies procedures for calibrating an optical spectrum analyzer that is developed for use in fibre-optic communications and designed to measure the power distribution of an optical spectrum. It does not apply to an optical wavelength meter that measures only centre wavelengths, a Fabry-Perot interferometer or a monochromator that has no display unit.

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.

IEC 60050-731, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication* (available at http://www.electropedia.org)

IEC 60793-2 (all parts), *Optical fibres – Part 2: Product specifications*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-731 and the following apply.

3.1
accredited calibration laboratory
calibration laboratory authorized by an appropriate national organization to issue calibration certificates that demonstrates traceability to national standards

3.2
calibration
set of operations that establish, under specified conditions, the relationship between the values of quantities indicated by a measuring instrument and the corresponding values realized by standards

Note 1 to entry: The results of a calibration permit either the assignment of measurand values to the indications or the determination of corrections with respect to the indications.

Note 2 to entry: A calibration may also determine other metrological properties such as the effects of influence quantities.

Note 3 to entry: The result of a calibration may be recorded in a document, called a calibration certificate or a calibration report.

[SOURCE: ISO/IEC Guide 99:2007, 2.39, modified — only the first part of the definition is used]

3.3
calibration under reference conditions
calibration which includes the evaluation of the test analyzer uncertainty under reference conditions (3.18)

3.4
calibration for operating conditions
calibration for operating conditions of an optical spectrum analyzer (3.15) including the evaluation of the test analyzer operational uncertainty

3.5
centre wavelength
centroidal wavelength
λ_c
power-weighted mean wavelength of a light source in vacuum

Note 1 to entry: The centre wavelength is expressed in nanometers (nm).

Note 2 to entry: For a continuous spectrum, the centre wavelength is defined as

$$\lambda_c = \frac{\int p(\lambda)\lambda d\lambda}{P_{total}} \quad (1)$$

For a spectrum consisting of discrete lines, the centre wavelength is defined as

$$\lambda_c = \frac{\sum_i P_i \lambda_i}{\sum_i P_i} \quad (2)$$

where

$p(\lambda)$ is the power spectral density of the source, for example, in W/nm;

λ_i is the vacuum wavelength of the i^{th} discrete line;

P_i is the power of the i^{th} discrete line, for example, in W;

P_{total} is the total power, for example, in W.

Note 3 to entry: The above integrals and summations theoretically extend over the entire spectrum of the light source.

3.6
confidence level
confidence interval
estimation of the probability that the true value of a measured parameter lies in the given range

Note 1 to entry: See expanded uncertainty (3.8)

3.7
coverage factor
k
factor by which the standard uncertainty (3.22), u, is multiplied to calculate the expanded uncertainty (3.8), U

Note 1 to entry: See 3.8.

3.8
expanded uncertainty
U
range of values within which the measurement parameter, at the stated confidence level (3.6), can be expected to lie

Note 1 to entry: It is equal to the coverage factor (3.7), k, times the combined standard uncertainty (3.22) u

$$U = ku \tag{3}$$

Note 2 to entry: When the distribution of uncertainties is assumed to be normal and a large number of measurements are made, then confidence levels (3.6) of 68,3 %, 95,5 % and 99,7 % correspond to k values of 1, 2 and 3 respectively.

Note 3 to entry: The measurement uncertainty of an optical spectrum analyzer (3.15) should be specified in the form of expanded uncertainty, U.

3.9
instrument state

complete description of the measurement conditions and state of an optical spectrum analyzer (3.15) during the calibration process

Note 1 to entry: Typical parameters of the instrument state are the displayed wavelength range in use, the resolution bandwidth (spectral resolution) (3.19), the display mode (W or dBm), warm-up time and other instrument settings.

3.10
measurement result
displayed or electrical output of any optical spectrum analyzer (3.15) in wavelength, in units of nm or μm, and in power level, in units of mW or dBm, after completing all operations suggested by the operating instructions (for example warm-up)

3.11
measurement range
set of values of measurands for which the error of a measuring instrument is intended to lie within specified limits

3.12
national measurement standard
standard recognized by a national decision to serve, in a country, as the basis for assigning values to other standards of the quantity concerned

[SOURCE: ISO/IEC Guide 99:2007, 5.3, modified]

3.13
national standards laboratory
laboratory which maintains the national standard (3.12)

3.14
operating conditions
all conditions of the measured and influential quantities, and other important requirements which the expanded uncertainty (3.8) of an optical spectrum analyzer (3.15) is intended to meet