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# INTERNATIONAL STANDARD

**Fibre optic sensors -**
**Part 1-4: Strain measurement - Distributed sensing based on Rayleigh scattering**

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# Fibre optic sensors - Part 1-4: Strain measurement - Distributed sensing based on Rayleigh scattering

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IEC 61757-1-4 has been prepared by subcommittee 86C: Fibre optic systems, sensing and active devices, of IEC technical committee 86: Fibre optics. It is an International Standard.

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

| Draft | Report on voting |
|---|---|
| 86C/1972/CDV | 86C/1995/RVC |

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,

– withdrawn, or

– revised.

# INTRODUCTION

This document is part of the IEC 61757 series, which is dedicated to fibre optic sensors. Generic specifications for fibre optic sensors are defined in IEC 61757.

The individual parts of the IEC 61757 series are numbered as IEC 61757-$M$-$T$, where $M$ denotes the measurand and $T$ the technology of the fibre optic sensor. The IEC 61757-1-$T$ series is concerned with strain measurements.

## 1 Scope

This part of IEC 61757 defines the terminology, structure, and measurement methods of distributed fibre optic sensors for absolute strain measurements based on spectral correlation analysis of Rayleigh backscattering signatures in single-mode fibres, where the fibre is the distributed strain measurement element in a measurement range from about 10 m to tens of km. This document also applies to hybrid sensor systems that combine the advantages of Brillouin and Rayleigh backscattering effects to obtain optimal measurement quality.

This document also specifies the most important features and performance parameters of these distributed fibre optic strain sensors and defines procedures for measuring these features and parameters.

This part of IEC 61757 does not apply to point measurements or to dynamic strain measurements. Distributed strain measurements using Brillouin scattering in single-mode fibres are covered in IEC 61757-1-2.

The most relevant applications of this strain measurement technique are listed in Annex A, while Annex B provides a short description of the underlying measurement principle.

## 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 61757, *Fibre optic sensors - Generic specification*

IEC 61757-1-2:2023, *Fibre optic sensors - Part1-2: Strain measurement - Distributed sensing based on Brillouin scattering.*

IEC 61757-2-2, *Fibre optic sensors - Part 2-2: Temperature measurement - Distributed sensing*

IEC 61757-3-2, *Fibre optic sensors - Part 3-2: Acoustic sensing and vibration measurement - Distributed sensing*

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

# Bibliography

IEC 60869-1, *Fibre optic interconnecting devices and passive components - Fibre optic passive power control devices - Part 1: Generic specification*

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

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