IEC 61757

Edition 2.0 2026-03

INTERNATIONAL STANDARD

Fibre optic sensors - Generic specification

ICS 33.180.99

ISBN 978-2-8327-1072-2

IEC 61757:2026-03(en)

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FOREWORD

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IEC 61757 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.

This second edition cancels and replaces the first edition published in 2018. This edition constitutes a technical revision.

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

a) expansion of the list of metrological parameters;
b) updates of the terms and definitions;
c) updates of the normative references and bibliography;
d) updates of the technical descriptions in Annex A.

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

Draft	Report on voting
86C/2008/FDIS	86C/2011/RVD

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– withdrawn, or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

A fibre optic sensor comprises an optical or optically powered sensing element in which incident light is modified by the measurand in such a way that the output light of the sensing element carries quantifiable information on the measurand. The sensing element can be the fibre itself or an optically powered element inserted along the optical path. In a fibre optic sensor, one or more parameters of the guided optical waves are directly or indirectly modified by the measurand somewhere in the optical sensing element, in contrast to a fibre optic data link where the optical information signal is merely transmitted from the transmitter to the receiver.

This document provides generic specifications on optical fibres, components, and sub-assemblies that pertain specifically to fibre optic sensing applications. It is intended to be used as a common working and discussion tool by the vendors of components and subassemblies that are integrated in fibre optic sensors, as well as by designers, manufacturers, and users of fibre optic sensors, independent of specific applications or installations. 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.

To better illustrate this classification scheme, Annex A gives examples of various fibre optic sensors. The examples are provided for illustration only and are not intended to be limitative, nor do they constitute a recommendation or endorsement of a particular transduction principle.

1 Scope

This document defines, classifies, and provides a framework of generic tests or measurement methods for characterizing and specifying fibre optic sensors, including their specific components and subassemblies. The requirements of this document apply to all related fibre optic sensor standards that are part of the IEC 61757 series. Other parts of the IEC 61757 series contain requirements that are specific to sensors that measure particular quantities, and to a particular style or variant of such a fibre optic sensor.

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 60068-1, *Environmental testing - Part 1: General and guidance*

IEC 60079-28, *Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation*

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

IEC 60825-2, *Safety of laser products - Part 2: Safety of optical fibre communication systems*

IEC 61300-3-35, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-35: Examinations and measurements - Visual inspection of fibre optic connectors and fibre-stub transceivers*

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components - Performance standard*

IEC TR 61931, *Fibre optic - Terminology*

IEC TR 62627-01, *Fibre optic interconnecting devices and passive components - Part 01: Fibre optic connector cleaning methods*

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

Bibliography

IEC 60050-151, *International Electrotechnical Vocabulary - Part 151: Electrical and magnetic devices* (available at www.electropedia.org)

IEC 60050-311, *International Electrotechnical Vocabulary - Electrical and electronic measurements - Part 311: General terms relating to measurements* (available at www.electropedia.org)

IEC 60060-1, *High-voltage test techniques - Part 1: General definitions and test requirements*

IEC 60654-4, *Operating conditions for industrial-process measurement and control equipment - Part 4: Corrosive and erosive influences*

IEC 60068-2-1, *Environmental testing - Part 2-1: Tests - Test A: Cold*

IEC 60068-2-2, *Environmental testing - Part 2-2: Tests - Test B: Dry heat*

IEC 60068-2-5, *Environmental testing - Part 2-5: Tests - Test S: Simulated solar radiation at ground level and guidance for solar radiation testing and weathering*

IEC 60068-2-6, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)*

IEC 60068-2-10, *Environmental testing - Part 2-10: Tests - Test J and guidance: Mould growth*

IEC 60068-2-11, *Environmental testing - Part 2-11: Tests - Test Ka: Salt mist*

IEC 60068-2-13, *Environmental testing - Part 2-13: Tests - Test M: Low air pressure*

IEC 60068-2-14, *Environmental testing - Part 2-14: Tests - Test N: Change of temperature*

IEC 60068-2-27, *Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock*

IEC 60068-2-30, *Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-42, *Environmental testing - Part 2-42: Tests - Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-43, *Environmental testing - Part 2-43: Tests - Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-78, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60793-1-20, *Optical fibres - Part 1-20: Measurement methods and test procedures - Fibre geometry*

IEC 60793-1-21, *Optical fibres - Part 1-21: Measurement methods and test procedures - Coating geometry*

IEC 60793-1-31, *Optical fibres - Part 1-31: Measurement methods and test procedures - Tensile strength*

IEC 60793-1-32, *Optical fibres - Part 1-32: Measurement methods and test procedures - Coating strippability*

IEC 60793-1-47, *Optical fibres - Part 1-47: Measurement methods and test procedures - Macrobending loss*

IEC 60793-1-54, *Optical fibres - Part 1-54: Measurement methods and test procedures - Gamma irradiation*

IEC 60794-1-21, *Optical fibre cables - Part 1-21: Generic specification - Basic optical cable test procedures - Mechanical tests methods*

IEC 60825 (all parts), *Safety of laser products*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test*

IEC 61000-4-3, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radiofrequency, electromagnetic field immunity test*

IEC 61000-4-4, *Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*

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

IEC 61300-2-1, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-1: Tests - Vibration (sinusoidal)*

IEC 61300-2-9, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-9: Tests - Shock*

IEC 61300-2-18, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-18: Tests - Dry heat*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-22: Tests - Change of temperature*

IEC 61300-2-34, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-34: Tests - Resistance to solvents and contaminating fluids of interconnecting components and closures*

IEC 61300-2-46, *Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-46: Tests - Damp heat, cyclic*

IEC 61757 (all parts), *Fibre optic sensors*

IEC 62368 (all parts), *Audio/video, information and communication technology equipment*

IEC TR 62222, *Fire performance of communication cables installed in buildings*

IEC TR 62283, *Optical fibres - Guidance for nuclear radiation tests*

IEC TR 62362, *Selection of optical fibre cable specifications relative to mechanical, ingress, climatic or electromagnetic characteristics - Guidance*

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

ISO/IEC TR 29106, *Information technology - Generic cabling - Introduction to the MICE environmental classification*

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