



# TECHNICAL REPORT



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**Fibre optic active components and devices – Test and measurement procedures –  
Part 7: Calculation methodology of laser safety class for optical transceivers  
and transmitters**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Calculation methodology.....	7
4.1 General.....	7
4.2 Wavelength.....	8
4.3 Time base.....	8
4.4 Hazard for eye and skin .....	8
4.5 Class categories .....	9
4.6 Measurement conditions 1, 2, and 3.....	9
4.7 Correction factors .....	12
4.8 Class 1 and Class 1M power calculations .....	13
5 Example of calculations .....	14
5.1 Class 1 power for MMF applications between 700 nm and 1 050 nm wavelength .....	14
5.2 Class 1 power for SMF applications between 1 200 nm and 1 400 nm wavelength .....	15
5.3 Class 1 power for SMF applications between 1 400 nm and 1 650 nm wavelength .....	16
6 Specific interface applications .....	17
6.1 Applications with wavelength-division multiplexing (WDM) .....	17
6.2 Fibre array applications.....	17
Annex A (informative) Hazard level calculations.....	19
A.1 General.....	19
A.2 Example of calculations .....	19
A.2.1 MMF applications at wavelengths between 700 nm and 1 050 nm.....	19
A.2.2 SMF applications at wavelengths between 1 200 nm and 1 400 nm .....	21
A.2.3 SMF applications at wavelengths between 1 400 nm and 1 650 nm .....	22
Figure 1 – Graphic illustration of distance to source and aperture stop .....	9
Figure 2 – Class 1 power $P_{i\max}$ for MMF applications .....	15
Figure 3 – Class 1 power $P_{i\max}$ for SMF applications ( $1\ 200\ \text{nm} < \lambda < 1\ 400\ \text{nm}$ ).....	16
Figure 4 – Class 1 power $P_{i\max}$ for SMF applications ( $1\ 400\ \text{nm} < \lambda < 1\ 650\ \text{nm}$ ).....	16
Figure A.1 – Maximal power in MMF for Class 1 and Hazard level 1 (700 nm to 1 050 nm) .....	21
Figure A.2 – Maximal power in SMF for Hazard levels 1 and 1M (1 200 nm to 1 400 nm) .....	22
Figure A.3 – Maximal power in SMF for Hazard levels 1 and 1M (1 400 nm to 1 650 nm) .....	23
Table 1 – Laser wavelength categorization for each specific parameter .....	8
Table 2 – Wavelength ranges for fibre optic telecommunication systems .....	8
Table 3 – Class 1 and Class 1M power criteria .....	9

Table 4 – Measurement aperture diameters and distances for evaluation..... 10

Table 5 – Values of  $1/\eta$  under Conditions 1, 2 and 3 for MMFs ..... 11

Table 6 – Values of  $d/r$  under Conditions 1, 2 and 3 for SMFs ..... 11

Table 7 – Values of  $C_6$  and  $T_2$  for an extended light source ..... 13

Table 8 – Values of the correction factors  $C_4$  and  $C_7$  ..... 13

Table 9 – Accessible Emission Limits (AEL)..... 13

Table A.1 – Power limits for Hazard levels 1 and 1M..... 19

Table A.2 – Related parameters for MMF applications ..... 20

Table A.3 – AEL values for Classes 1 and 1M and Hazard levels 1 and 1M ..... 20

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES –  
TEST AND MEASUREMENT PROCEDURES –**

**Part 7: Calculation methodology of laser safety class for  
optical transceivers and transmitters**

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IEC TR 62150-7 has been prepared by subcommittee 86C: Fibre optic active components and devices, of IEC technical committee 86: Fibre optics. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
86C/1934/DTR	86C/1940/RVDTR

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 Technical Report 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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts in the IEC 62150 series, published under the general title *Fibre optic active components and devices – Test and measurement procedures*, 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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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## INTRODUCTION

Laser safety criteria calculations for optical transceivers and transmitters are defined in IEC 60825-1. However, the calculation methodology in IEC 60825-1 is complicated and covers a wide range of laser products. This document provides simple calculation guidelines that are tailored to transceiver and transmitter products for fibre optic telecommunication systems.

The intent of this document is to resolve possible confusion on how to handle the specifications in IEC 60825-2, which define safety criteria for Optical Fibre Communication Systems (OFCSs). In IEC 60825-1 the safety categories are called "Class  $n$ ", but in IEC 60825-2 they are called "Hazard level  $n$ ". As single units that are not connected to an OFCS, optical transceivers and transmitters are components, for which the specifications of IEC 60825-1 are applicable, that is the safety categories "Class  $n$ ". However, when optical transceivers and transmitters are integrated in (i.e. connected to) an Optical Fibre Communication System, the specifications of IEC 60825-2 apply, which uses the safety categories "Hazard level  $n$ ". Hence, when the power levels in an OFCS are examined, the "Hazard level  $n$ " categories of IEC 60825-2 apply. For the same number  $n$ , the power limits of "Hazard level  $n$ " are usually lower than the power limits of "Class  $n$ ". The fact that the power limits for "Class  $n$ " and "Hazard level  $n$ " are sometimes different causes considerable confusion in the industry. This document therefore also includes Hazard level calculations, which are provided in informative Annex A.

## **FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – TEST AND MEASUREMENT PROCEDURES –**

### **Part 7: Calculation methodology of laser safety class for optical transceivers and transmitters**

#### **1 Scope**

This part of IEC TR 62150, which is a technical report, provides simple calculation guidelines for the laser safety class of optical transceivers and transmitters, whose baseline standard is IEC 60825-1. The calculation methodology for Class 1 and Class 1M safety levels is the main scope of this document, because most of optical transceivers and transmitters are specified for these classifications. The calculations and classifications in this document follow IEC 60825-1, which specifically advises that laser safety classifications be based on tests that consider any reasonably foreseeable single-fault condition in the application of a transceiver or transmitter. More information can be found in IEC 60825-1:2014, 5.1.

#### **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 60825-1:2014, *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 (OFCSs)*

NOTE IEC 60825-2:2021 refers to IEC 60825-1:2014 as a normative reference.