TECHNICAL REPORT

IEC TR 60825-9

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Safety of laser products –

Part 9:
Compilation of maximum permissible exposure to incoherent optical radiation

Sécurité des appareils à laser –

Partie 9:
Exposition maximale admissible au rayonnement lumineux incohérent

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF LASER PRODUCTS –

Part 9: Compilation of maximum permissible exposure to incoherent optical radiation

FOREWORD

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Technical reports do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful by the maintenance team.

IEC 60825-9, which is a technical report, has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
76/171/CDV	76/204/RVC

Full information on the voting for the approval of this technical report 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 3.

This document which is purely informative is not to be regarded as an International Standard.

SAFETY OF LASER PRODUCTS –
Part 9: Compilation of maximum permissible exposure to incoherent optical radiation

1 Scope and Object

This Technical Report reconciles current **M**aximum **P**ermissible **E**xposure (MPE) values for the exposure of the human eye and skin to incoherent optical radiation from artificial sources in the wavelength range from 180 nm to 3000 nm with the ultimate goal of harmonisation. Exposure limits between 3000 nm and 1 mm wavelength are currently undefined.

These values are based on the best available information from experimental studies and should be used only as guides in the control of exposure to radiation from artificial sources and should not be regarded as a precise line between safe and dangerous levels.

NOTE The values of this report are applicable to most individuals, however, some individuals may be hypersusceptible or otherwise unusually responsive to optical radiation because of genetic factors, age, personal habits (smoking, alcohol, or other drugs), medication, or previous exposures. Such individuals may not be adequately protected from adverse health effects from exposure to optical radiation at or below the maximum permissible exposure values of this report. Medical advise should be sought to evaluate the extent to which additional protection is needed.

These values were mainly developed for exposure to artificial sources. They may also be used for the evaluation of exposure to sunlight.

The MPE values should not be applicable to exposure of patients to optical radiation for the purpose of medical treatment.

Maximum permissible exposure values for the exposure to radiation from laser sources are defined in IEC 60825-1.

NOTE 1 Basic documents of this report were IEC 60825-1 (addressing lasers) and the IRPA/ICNIRP Guidelines (addressing incoherent sources). ACGIH limits are slightly different in wavelength ranges and in limit values.

NOTE 2 In spite of the fact that LEDs emit mainly incoherent radiation they are currently dealt with in IEC 60825-1.

NOTE 3 There are no damage mechanisms which are known to be different for coherent and incoherent sources. However, in many cases the limit values in IEC 60825-1 are more conservative than the values in this report. This is especially true in wavelength regions where no lasers were available when IEC 60825-1 was originally developed.

NOTE 4 Exposures to levels at the MPE values given may be uncomfortable to view or feel upon the skin.

NOTE 5 In the UV-B and UV-C spectral ranges the MPE values approach the radiant exposures producing minimally detectable biological changes in the surface corneal cells. Levels producing harmful effects are 2 to 3 times greater.

1.1 The object of this technical report is to provide guidance for the protection of persons from incoherent optical radiation in the wavelength range from 180 nm to 1 mm by indicating safe levels of optical radiation which are believed to be safe for most individuals in the sense that exposure at or below these levels will create no adverse effects. Because only limited knowledge exists about the effects of a long-term exposure, most MPEs are based on acute effects of the optical radiation exposure during an eigth hours work day.

1.2 To provide procedures and methods how the level of optical radiation should be measured and evaluated for the purpose of comparison with the maximum permissible exposure.

2 Reference documents

IEC 60050(845):1987, *International Electrotechnical Vocabulary – Chapter 845: Lighting*

IEC 60825-1:1993, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*
Amendment 1:1997*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 11145:1994, *Optics and optical instruments – Lasers and laser-related equipment – Vocabulary and symbols*

ISO/IEC Guide 51:1997, *Safety aspects – Guidelines for their inclusion in standards*

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* There is a consolidated edition 1.1 (1998) that includes IEC 60825-1 (1993) and its amendment 1 (1997).