

Australian/New Zealand Standard™

Safety of laser products

Part 14: A user's guide



AS/NZS IEC 60825.14:2011

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee SF-019, Personal Protection Against Laser Radiation. It was approved on behalf of the Council of Standards Australia on 20 October 2011 and on behalf of the Council of Standards New Zealand on 25 October 2011. This Standard was published on 5 December 2011.

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PREFACE

This document was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-019, Personal Protection Against Laser Radiation, to supersede Section 3 of AS/NZS 2211.1:2004, *Safety of laser products*, Part 1: *Equipment classification, requirements and user's guide*. AS/NZS 2211.1:2004 was a modified adoption of IEC 60825-1:2001, which incorporated a user's guide as Section 3 of the Standard. The 2007 revision of IEC 60825-1 relocated the user's guide into a new part of the series, IEC/TR 60825-14.

This document is identical with, and has been reproduced from IEC/TR 60825-14, Ed.1.0 (2004), *Safety of laser products—Part 14: A user's guide*.

The objectives of this document are as follows:

- (a) To protect people from laser radiation in the wavelength range 180 nm to 1 mm by indicating safe working levels of laser radiation.
- (b) To help users understand the general principles of laser safety management and use manufacturer supplied information to develop proper precautions and establish procedures to mitigate risks.
- (c) To provide a framework for users to identify and evaluate hazards and assess the risks in order to set up and maintain appropriate control measures.
- (d) To reduce the possibility of injury by minimizing unnecessary exposure to radiation and to provide safe usage of laser products by specifying user control methods.
- (e) To protect people against other hazards resulting from the operation and use of laser products.

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- (i) Its number appears on the cover and title page while the International Technical Report number appears only on the cover.
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The term 'informative' has been used in this document to define the application of the annex to which it applies. An 'informative' annex is only for information and guidance.

Standards in the IEC 60825 series may have been adopted as either AS/NZS IEC 60825 series standards, e.g. IEC/TR 60825-14 has been adopted as AS/NZS IEC 60825.14, or AS/NZS 2211 series standards, e.g. IEC 60825-4 has been adopted as AS/NZS 2211.4.

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INTRODUCTION

To help in the use of this technical report, an outline of the topics that are covered within it is given below. The topics are presented in the order in which they would normally be considered as part of a laser safety programme.

- Safety responsibilities with regard to the operation of lasers and the need for appropriate training are covered in Clause 3.
- The meaning of the laser product classes and the assessment of laser exposure are covered in Clause 4.
- The determination of the maximum permissible exposure (MPE), and the concept of the hazard distance and hazard zone within which the MPE can be exceeded, are covered in Clause 5.
- Associated laser hazards (that is, hazards other than those of eye or skin exposure to the emitted laser beam) are covered in Clause 6.
- A three-stage process for evaluating risk (arising from both the laser radiation hazards discussed in Clauses 4 and 5, and the associated laser hazards discussed in Clause 6) is covered in Clause 7. These three stages are:
 - 1) the identification of all potentially injurious situations,
 - 2) the assessment of the risk arising from these situations and
 - 3) the determination of the necessary protective measures.
- The use of control measures for reducing the risk to an acceptable level is covered in Clause 8.
- The need to ensure the continuation over time of safe laser operation is covered in Clause 9.
- The reporting of laser-related hazardous incidents and the investigation of accidents is covered in Clause 10.
- The role of medical surveillance (eye examinations) is covered in Clause 11.
- Additional information on the use of interlock protection is given in Annex A.
- Examples of laser safety calculations are given in Annex B.
- An explanation of the biophysical effects of laser exposure to the eyes and skin is given in Annex C.

AUSTRALIAN/NEW ZEALAND STANDARD

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1 Scope and object

This technical report provides guidance on best practice in the safe use of laser products that conform to IEC 60825-1. The terms "laser product" and "laser equipment" as used in this document also refer to any device, assembly or system, which is capable of emitting optical radiation produced by a process of stimulated emission. However, unlike IEC 60825-1, this document does not cover light-emitting diodes (LEDs).

Class 1 laser products normally pose no hazard and Class 2 laser products present only a minimal hazard. With these products, it is normally sufficient to follow the warnings on the product labels and the manufacturer's instructions for safe use. Further protective measures as described in this document should not be necessary.

This document emphasizes evaluation of the risk from higher power lasers, but the users of the lower power lasers may benefit from the information contained. See Table 1 for an overview.

This technical report can be applied to the use of any product that incorporates a laser, whether or not it is sold or offered for sale. Therefore, it applies to specially constructed lasers (including experimental and prototype systems).

This technical report is intended to help laser users and their employers to understand the general principles of safety management (Clause 3), to identify the hazards that may be present (Clauses 4 to 6), to assess the risks of harm that may arise (Clause 7), and to set up and maintain appropriate control measures (Clauses 8 to 11).

Laser control measures vary widely. They depend on the type of laser equipment in use, the task or process being performed, the environment in which the equipment is used and the personnel who may be at risk of harm. Specific requirements for certain laser applications is given in other documents in the IEC 60825 series (see the Foreword or bibliography for the titles of these documents).

The terms "reasonably foreseeable" and "reasonably foreseeably" are used in this document in relation to certain specific events, situations or conditions. It is the responsibility of the person using this document to determine what is "reasonably foreseeable" and what might occur "reasonably foreseeably", and to be able to defend, on the basis of risk-assessment criteria, any such judgements that are made.

Reference is made in this document to laser "users". This should be taken to include persons having responsibility for safety in addition to those who actually work with or operate laser equipment.