

Australian/New Zealand Standard™

**Guide to the safe use of lasers in health  
care**

## **AS/NZS 4173:2004**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee HE-003, Medical Electrical Equipment. It was approved on behalf of the Council of Standards Australia on 18 October 2004 and on behalf of the Council of Standards New Zealand on 15 October 2004.

This Standard was published on 22 November 2004.

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The following are represented on Committee HE-003:

Australasian College of Physical Scientists and Engineers in Medicine  
Australasian Society for Ultrasound in Medicine  
Australian Chamber of Commerce and Industry  
Australian Dental Association  
Australian Institute of Radiography  
Australian Radiation Protection and Nuclear Safety Agency  
Australian Society of Anaesthetists  
Australian and New Zealand College of Anaesthetists  
Canterbury District Health Board, New Zealand  
College of Biomedical Engineering Institution of Engineers Australia  
Commonwealth Department of Health and Ageing  
Department of Defence (Australia)  
Medical Industry Association of Australia  
Ministry of Economic Development, New Zealand  
Royal Australian and New Zealand College of Radiologists  
Testing Interests (Australia)  
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# Australian/New Zealand Standard™

## **Guide to the safe use of lasers in health care**

Originated as AS/NZS 4173:1994.  
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## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Sub-Committee HE-003-12, Lasers in Medical Procedures, under the responsibility of Committee HE-003, Medical Electrical Equipment, to supersede AS/NZS 4173:1994, *Guide to the safe use of lasers in health care*.

The following interests played a major role in the preparation of this Standard:

Australasian Medical and Clinical Laser Association

Australian and New Zealand College of Anaesthetists

Australian College of Operating Room Nurses

Australian Medical and Clinical Laser Association

Australian Medical Association

Health Department of Western Australia

Hutt Valley District Health Board, New Zealand

Department of Health, N.S.W.

Dunedin Hospital, New Zealand

Queensland Health

Royal Australasian College of Ophthalmologists

Royal Australian College of Physicians

The objective of this Standard is to provide guidance in the safe use of lasers and laser systems for diagnostic, cosmetic and therapeutic uses in health care facilities (including hospitals, private medical facilities and dental practices). To this end, it includes explanations of basic laser physics and radiation/tissue interactions, and also identifies engineering and administrative control measures designed to avoid the most significant hazards. Protocols to be observed during specialist medical and dental procedures are also included.

It is not intended that the recommended control measures should restrict or limit the use of laser radiation which may be intentionally administered to a patient for diagnostic, cosmetic, therapeutic, surgical or medical research purposes. However, the controls are those considered necessary for the safety of all attending staff, as well as those which should be considered as fundamental to patient safety.

This Standard was prepared in the knowledge that separate Standards were being developed for medical laser equipment (to supplement the safety procedures and requirements of AS/NZS 2211.1) and for medical laser installations. These Standards will incorporate mandatory engineering and installation requirements to be observed by the manufacturers and constructors. Accordingly, this Standard concentrates on identifying those administrative needs and user precautions which are of equal importance. In particular, the importance of staff training is emphasized and this Standard—

- (a) identifies appropriate levels of staff training (i.e. not all staff need to be trained to the same level); and
- (b) recommends that relevant educational organizations insist on formal medical laser training and certification of post-graduate specialists.

The laser types and applications addressed in this Standard are current at the time of writing. Given the rapid development in the field, efforts will be made to revise the Standard as the technology and its applications change.

This Standard differs from the 1994 edition in the following respects:

- (i) Changes to the laser classification scheme (taking into consideration the 2004 revision of AS/NZS 2211).
- (ii) The terminology and language used in the new edition better reflect its intended purpose as a 'guide', making it easier to read, interpret, and implement where applicable, for users and administrators alike.
- (iii) Descriptions and definitions have been updated, taking into account the immense changes in the technology and science of lasers in health care since 1994.
- (iv) The new version incorporates examples relevant to a broader target audience, reflecting the evolution and diversity of laser use in health care.
- (v) The greatly expanded Appendices address, in a more practical and usable form, the administrative aspects of implementing safe laser practices and procedures at both individual and institutional levels.

Standards Australia acknowledges the contribution of the Australian Centre for Medical Laser Technology to this Standard.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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## FOREWORD

The advent of laser technology offers the potential for practical solutions to clinical procedures in areas hitherto regarded as difficult to manage. These include areas where the tissue is delicate (e.g. the retina), extremely vascular, (e.g. the liver and tumours), or where access is difficult, (e.g. the central trachea) and especially where tissue is ill-defined, (e.g. in the lung) or where there are multiple disease sites (e.g. in the bladder).

## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

### Australian/New Zealand Standard Guide to the safe use of lasers in health care

#### SECTION 1 SCOPE AND GENERAL

##### 1.1 SCOPE

This Standard provides a guide to the safe use of lasers and laser systems in diagnostic, cosmetic, therapeutic, medical and dental procedures in the treatment of humans.

The Standard explains the procedural and administrative controls necessary for the safety of patients, health care staff, maintenance personnel, and others who may be in the vicinity of the treatment room and in need of protection against inadvertent exposure. Engineering controls which form part of the laser equipment or the installation are also briefly described to provide an understanding of the general principles of protection. However, detailed specification of laser equipment and installation controls are not included in this Standard, such requirements being separately specified in AS/NZS 2211.1.

The principles of laser operation and the nature of the associated hazards are briefly described. Examples of specific guidelines for the safe use of lasers in a variety of clinical applications are given in Appendix A.

NOTE: Intense pulse light sources (IPLS) are also used in health care, e.g. cosmetic treatment. These sources are polychromatic and fall outside the scope of this Standard. However, they still may be an optical or thermal hazard, and the safety principles in this Standard may be applicable. In particular, safety eyewear designed for laser use is not, in general, safe for use with IPLS.

##### 1.2 APPLICATION

The Standard is intended for application in hospital operating rooms, clinics or private practices, where laser equipment is used in association with diagnosis, therapy, surgery or cosmetic treatment.

Safety principles incorporated in this Standard may be equally applied to the use of lasers in veterinary practice.

It is intended for use by the governing body of a health care facility (e.g. a hospital), the management, clinicians, nurses, engineers, physical scientists, dentists and other personnel concerned with the application or the use of lasers in diagnostic, cosmetic, therapeutic, medical and dental procedures.

##### 1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

###### AS

- |        |   |
|--------|---|
| 1885   | Measurement of occupational health and safety performance   |
| 1885.1 | Part 1: Describing and reporting occupational injuries and disease (known as the National Standard for work-place injury and disease recording) |

###### AS/NZS

- |      |  |
|------|--|
| 1336 | Recommended practices for occupational eye protection            |
| 1715 | Selection, use and maintenance of respiratory protective devices |