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Australian Standard 2397—1980

GUIDE TO THE SAFE USE OF LASERS IN THE CONSTRUCTION INDUSTRY

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Atomic Energy Commission

Australian Council of Trade Unions

Confederation of Australian Industry

Department of Defence

Department of Health

Department of Health, Qld

Department of Industrial Relations, N.S.W.

Department of Labour and Industry, Victoria

Department of Labour Relations, Qld

Department of Productivity

Health Commission of New South Wales

Manufacturers and suppliers of lasers

Master Builders Association

Melbourne and Metropolitan Board of Works

Metropolitan Water Sewerage and Drainage Board, N.S.W.

Royal Australian College of Ophthalmologists

Safety Institute of Australia

Victorian Trades Hall Council

This standard, prepared by Committee SF/19, Personal Protection Against Laser Radiation, was approved on behalf of the Council of the Standards Association of Australia on 12 August 1980, and was published on 1 October 1980.

AUSTRALIAN STANDARD

GUIDE TO THE SAFE USE OF LASERS IN THE CONSTRUCTION INDUSTRY

AS 2397—1980

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PREFACE

This standard was prepared by the Association's Committee on Personal Protection Against Laser Radiation, as a supplementary standard to AS 2211, Code of Practice for Laser Safety. It was prepared following requests from interests involved in the construction industry, who felt that management, employees and authorities concerned with certain tasks in that industry needed a ready reference to safety procedures appropriate for lasers in their industry without necessarily having to refer to the more complex standard AS 2211.

The standard refers exclusively to safety matters associated with visible light lasers used for alignment, levelling, control and survey tasks in the construction industry. While the general requirements of AS 2211 apply to the design, manufacture and use of such lasers, this standard—

(a) contains only those requirements pertinent to lasers used for alignment, levelling, control and survey tasks in the construction industry;

(b) presents such requirements in terminology familiar to and/or understandable by tradesmen and non-professional persons who may operate lasers in the course of their employment; and

(c) standardizes guidelines and syllabus for the training and certification of Laser Safety Officers (LSOs). Laser safety officers are persons trained in the theory and practical application of lasers and with authority and responsibility for ensuring that other persons do not receive harmful exposure to laser radiation.

The warning label and sign specified in AS 2211 have been reproduced in Appendix B of this standard for information.

While this standard is directed towards those construction applications outlined above, much of the material in the standard could be used for guidance in other laser applications such as mining and tunnelling, outdoor land survey, marine survey, metrology and machine alignment, etc. The need for a further supplementary standard for these areas is under consideration.

Requirements in this standard in no way negate or degrade the requirements specified in AS 2211.

This standard may require reference to the following standards:

AS 1885 Code of Practice for Recording and Measuring Work Injury Experience
AS 2211 Code of Practice for Laser Safety

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

GUIDE TO THE SAFE USE OF LASERS IN THE CONSTRUCTION INDUSTRY

SECTION 1. SCOPE AND APPLICATION

1.1 SCOPE. This standard sets out safety requirements for the use of lasers for alignment, levelling, control and survey tasks in the construction industry.

It reproduces and supplements those requirements of AS 2211 relevant to such work, but does not cover the design and manufacture of lasers nor the use of lasers in other applications.

1.2 APPLICATION. This standard is intended as a reference by persons concerned with the use of lasers for alignment, levelling, control and survey tasks in the construction industry.

NOTES:

1. Although this standard is directed towards those construction applications outlined above, much of the material in the standard could be used for guidance in other laser applications such as mining and tunnelling, outdoor land survey, marine survey, metrology and machine alignment, etc.
2. Requirements in this standard in no way negate or degrade the requirements specified in AS 2211.

SECTION 2. LASERS—HAZARDS AND CLASSIFICATION

2.1 LASERS—GENERAL. Laser devices are sources of light which differ from all other sources of light in both the mechanism of operation and in the quality of the light produced.

Most low-powered lasers emit light in the form of a narrow light beam of low divergence (spread) many times brighter than the sun. 'Radiation' from those types of laser used in the construction industry means the light beam emerging from it. X-rays, microwaves or other invisible components of the electromagnetic spectrum are not included in the light (radiation) emitted from the low-powered, visible light lasers used for alignment, levelling, control and survey tasks in the construction industry.

2.2 LASER HAZARDS—GENERAL. Lasers, if of sufficiently high power, may inflict damage to the eye or skin. This damage can result from direct viewing or from reflections from flat mirror-like (specular) surfaces. Diffuse reflections (from flat surfaces) are not hazardous except from high power lasers (not normally used in alignment, levelling, control or survey applications).

A full explanation of the biological damage mechanisms is detailed in Section 3 and Appendix C of AS 2211.

Lasers used for surveying, levelling, control or alignment tasks in the construction industry should preferably be of a sufficiently low power (Class 1 or Class 2 lasers) that little or no hazard exists.

Class 3A lasers, which are higher powered than Class 2 but have restricted energy density, may also be used for these tasks provided that the additional engineering and administrative controls listed in this standard are enforced.

Class 3B and Class 4 lasers shall not be used for these applications.

NOTE: Use of Class 3B and Class 4 lasers for other applications is not covered in this standard. Their use for other applications requires reference to AS 2211 and the enforcement of very strict controls, including denial of access.

2.3 LASER HAZARDS—CLASSIFICATION. A system of classification of laser devices is specified in AS 2211. That system of classification ranks the potential hazards of lasers, either in direct exposure or specular reflections, as follows:

(a) Class 1 lasers are safe for use under all conditions of exposure.

(b) Class 2 lasers are low-power devices the use of which requires some administrative controls but presents little or no potential hazard, e.g. eye protection is normally afforded by normal blink and aversion responses.

(c) Class 3A lasers emit higher levels of light, e.g. visible radiation, and their use requires more stringent engineering and administrative precautions than those necessary with Class 2.

(d) Class 3B lasers emit either invisible or visible radiation potentially hazardous to the eye and skin.

(e) Class 4 lasers are high power devices capable of producing diffuse reflections hazardous to the eye; skin exposure to the direct beam of a Class 4 laser is also hazardous.

2.4 CLASSIFICATION OF LASERS—RECOGNITION. Lasers are required to be manufactured, calibrated and labelled in accordance with the design limits specified in Section 4 of AS 2211.

Users of lasers must check the classification marking (labelling) on lasers used for alignment, levelling, control and survey tasks to ensure that—

(a) no laser marked with a classification higher than Class 3A is used;

(b) no unclassified laser is used; and

(c) on-site safety precautions appropriate to the class of laser are enforced.

NOTES:

1. It is the responsibility of the manufacturer or his agent to provide correct classification of a new laser product.
2. Unclassified laser products already in use prior to publication of AS 2211 should be classified by the user in consultation with the manufacturer, wherever possible (see Section 4 of AS 2211).