

Australian Standard 2243, Part 5—1980

SAFETY IN LABORATORIES Part 5—NON-IONIZING RADIATIONS

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STANDARDS ASSOCIATION OF AUSTRALIA
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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 Institute of Petroleum Ltd
Broken Hill Pty Co Ltd
Commonwealth Scientific and Industrial Research Organization
Department of Productivity
Department of Science and the Environment
State Laboratories, Victoria

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AUSTRALIAN STANDARD

**CODE OF PRACTICE FOR
SAFETY IN LABORATORIES
Part 5
NON-IONIZING RADIATIONS**

AS 2243, Part 5—1980



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PREFACE

This standard was prepared by the Association's Committee on Safety in Laboratories under the direction of the Chemical Standards Board.

It deals with situations involving the use of non-ionizing radiations in the various forms in which these are encountered in laboratories. It thereby supplements the safety information given in the other Parts in the same series and, in particular, Part 4 which deals with ionizing radiations. Because of the varied and specialized nature of the subject matter dealt with, it has been decided to include individual listings of relevant reference documents at the end of each Section, for specific use in connection with that Section.

Other subjects being treated in this series are as follows:

- Part 1—General
- Part 2—Chemical
- Part 3—Microbiology
- Part 4—Ionizing Radiations
- Part 6—Mechanical Aspects
- Part 7—Electrical Aspects

This standard makes reference to the following standards and documents:

- | | |
|------------|--|
| AS 1216 | Code of Practice for Safe Handling of Dangerous Goods
Part 1—Classification and Class Labels for Dangerous Goods |
| AS 1259 | Sound Level Meters
Part 1—Type 1, General Purpose
Part 2—Type 2, Precision
Part 3—Precision Sound Level Meter for the Measurement of Impulsive Sounds |
| AS 1269 | SAA Hearing Conservation Code |
| AS 1270 | Hearing Protection Devices |
| AS 1319 | Rules for the Design and Use of Safety Signs for the Occupational Environment |
| AS 1336 | Code of Practice for Industrial Eye Protection |
| AS 1338 | Protective Filters Against Optical Radiation in Welding and Allied Operations |
| AS 1633 | Glossary of Acoustic Terms |
| AS 1885 | Code of Practice for Recording and Measuring Work Injury Experience |
| AS 2107 | Ambient Sound Levels for Areas of Occupancy Within Buildings |
| AS 2211 | Code of Practice for Laser Safety |
| AS 3201.1 | Diathermy Equipment |
| AS 3301 | Approval and Test Specification for Particular Requirements for Microwave Ovens |
| AS T40 | Ultrasonic Therapeutic Equipment |
| AS Z33 | Preferred Frequencies and Band Centres for Acoustical Measurements |
| AS Z41 | Octave, Half-octave and One-third Octave Band Pass Filters intended for the Analysis of Sound and Vibrations |
| AS | Sunscreen Products* |
| AS | Limits for Microwave Exposure* |
| SAA MP44 | Guide for the Use of Sound Measuring Equipment
Part 1—Portable Sound Level Meters |

*In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA**Australian Standard****CODE OF PRACTICE FOR SAFETY IN LABORATORIES****PART 5—NON-IONIZING RADIATIONS****FOREWORD**

Except for acoustic and ultrasonic radiation, the non-ionizing radiations that may be detrimental to human health are electromagnetic in nature (see Appendix A). This Part of the code outlines precautions needed when working with radiations in the ultraviolet (UV), visible (including lasers), infrared (IR) and radio-frequency portions of the electromagnetic spectrum as well as with acoustic and ultrasonic radiation.

The dominant natural source of non-ionizing radiation is the sun from which humans are exposed to radiation ranging in wavelength from 290 nm to 4 μm . These limits are set by atmospheric filtration so that irradiance above 295 nm fluctuates considerably, depending on the obliquity of the ray path through a variable amount of ozone in the stratosphere. Of a maximum energy input at sea-level of about 1 kW/m², about 40 percent falls in the visible range (400 nm to 700 nm) at least 50 percent is in the infrared range, and up to 10 percent is in the ultraviolet range. For humans, its most hazardous part, contributing to sunburn and skin cancer, is confined to not more than 1 percent of the energy at wavelengths no longer than 320 nm to 325 nm.

The energy concentration of sunlight is now often extended to other wavelengths or is surpassed in strength by artificial sources of radiation applied for such purposes as lighting, photochemistry and communication. In these fields there is an increasing need for care against damaging situations.

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Part of the code identifies the non-ionizing radiations encountered in laboratories and the associated hazards and is intended as a laboratory standard reference document for general information on the safety requirements relating to the usage of non-ionizing radiations in laboratories. Although this Part makes recommendations to prevent accidents arising from the use of these radiations, it is not intended that it should contain all the relevant information about the usage and safety requirements; where this information is available in other standards, it is referred to again at the end of each Section of this Part.

1.2 GENERAL PRINCIPLES OF PROTECTION.

1.2.1 Operator Training. All persons working in areas where potentially hazardous radiation sources are used should be instructed in—

- (a) the nature of any associated hazard;
- (b) minimization of the hazard;
- (c) methods of protecting against damage;
- (d) recognition, assessment and possible treatment of any effect from over-exposure; and
- (e) the necessity of reporting any incident to the relevant safety or health personnel.

No situation should be allowed to continue where the exposure directly on skin or eyes is expected to be greater than the maximum permissible level. At all times it is good sense to conduct operations in such a way that exposure is as low as readily achievable in relation to the benefit likely to result from the task in hand.

Other persons should be excluded from or warned of potentially hazardous areas by signs* and barriers commensurate with the degree of risk.

1.2.2 Safeguards. There are numerous effective safeguards against the hazards of non-ionizing radiation. Some of these safeguards are generally applicable to all forms of non-ionizing radiation while others are specific and are given in the relevant Section.

- (a) The general safeguards are—
 - (i) shielding the sources thus protecting individuals from direct or indirect exposure to the radiation;
 - (ii) maximizing the distance between the source and the operator;
 - (iii) minimizing the exposure time;
 - (iv) providing individuals with appropriate protective material and clothing, such as proper eyeshields.
- (b) In the application of these safeguards care must be taken to ensure their effectiveness by, for example, measurement where possible. This is

important because of the variation of irradiance with the type of source, the range of wavelengths of radiation emitted and the type of field encountered. Details of such considerations are discussed under the radiation categories and in Appendix C.

1.3 LASER ACCIDENT REPORTING.

1.3.1 Accident Report. In all cases where an injury due to a laser is suspected, the organization's Safety Officer shall prepare a report of the circumstances.

NOTES:

1. Attention is drawn to AS 1885.
2. Employers may be required by regulation to report all lost time injuries to the relevant Statutory Authority.

1.3.2 Composition of the Report. The report shall contain the following:

- (a) A summary of the circumstances of the incident occasioning the injury which summary shall specify—
 - (i) the date, location and time of the incident;
 - (ii) details of the experience of the injured person;
 - (iii) the cause(s) of the occurrence of the incident;
 - (iv) the Safety Officer's recommendations to prevent a recurrence; and
 - (v) the suspected nature of the injury sustained by the person.
- (b) Full narrative statements from all persons (including the Safety Officer and, if practicable, the operator) who were engaged in the relevant operation and who can detail any relevant information pertinent to the occurrence of the incident.
- (c) Such medical reports in relation to the injured person as are available, being reports compiled both before and after the occurrence of the incident.
- (d) Full details of the type of laser product used and in particular, noting the condition of such equipment immediately after the incident.

1.3.3 Disposition of Equipment. In any case in which component malfunction was likely or suspected to have been a cause of an accident, the equipment shall be immediately sealed and conveyed to an appropriate laboratory for testing and report.

1.3.4 Disposition of Reports. The Safety Officer shall forward one copy of his report to one appropriate Regulatory Authority, to be retained by such authority.

*See AS 1216, Part 1, and AS 1319.