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LABORATORY CONSTRUCTION

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The following interests are represented on Committee BD/46:

Australian Atomic Energy Commission
Australian Chemical Industry Council
Board of Fire Commissioners, New South Wales
Commonwealth Scientific and Industrial Research Organization
Department of Defence
Department of Health (Commonwealth)
Department of Science (Commonwealth)
Insurance Council of Australia
Metropolitan Fire Brigades Board, Melbourne
National Association of Australian State Road Authorities
National Association of Testing Authorities, Australia
National Building Technology Centre
Public Works Department, New South Wales
Railways of Australia Committee
Royal Australian Chemical Institutes
Royal Australian Institute of Architects

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PREFACE

This Standard was prepared by the Association's Committee on Laboratory Construction for Safe Working Practice.

Accidents in several laboratories in the middle 1960s caused at least two employers of scientists including the N.S.W. Public Service Board and CSIRO to produce codes applicable to the use of laboratories, and led to the establishment of a committee by the Standards Association of Australia to produce AS 2243, Safety in Laboratories. That committee (CH/26) also realized that a Standard dealing with *construction* was necessary to complement AS 2243 and a separate committee (BD/46) was formed to produce this Standard. Design and construction recommendations currently included in AS 2243 will be generally removed from that Standard at its next edition. They are now included in this Standard.

This Standard is intended to provide an authoritative source of information and guidance for the design and construction of laboratory buildings, based on considerations for the safety of workers occupying such buildings. It should not be regarded as a detailed design specification.

This Standard has no legal authority in its own right, but may acquire legal standing in the following circumstances:

(a) Adoption by a Regulatory Authority having jurisdiction.

(b) Adoption by an owner as a required standard of construction when p[illegible]cing a contract.

It is recommended that the design of a laboratory should incorp[illegible]ate those parts of this Standard which are applicable. The Standard may not need to be applied rigorously to small operations, such as one or two persons in a single room, but its principles should be observed.

Section 2 of this Standard has been drafted in mandatory form. Other sections are in partly mandatory and partly advisory form, depending on the committee's assessment of the importance of particular aspects.

This Standard should be used in conjunction with the various Australian Building Regulations and other regulations such as those on industrial safety, and with a number of other Australian Standards referenced in the Annex.

CONTENTS

FOREWORD

1 Laboratory hazards. Laboratories in general represent a higher potential hazard than most other occupancies, particularly to non-technical staff. Organizations responsible for commissioning and operating laboratories have an obligation to provide working environments that are basically safe, not only to their normal occupants, but to others who may enter such buildings. Each laboratory must therefore be designed, constructed, maintained and operated so as to reduce potential hazards to an acceptable level.

2 Safe working practice. A disregard for safe working practices can often negate the provisions for safety that are built into a workplace. It is therefore essential that workers follow safe working procedures in the course of their work. It is also necessary that persons with supervisory responsibility in a laboratory should ensure that staff under their control follow safe working practices. This Standard and the AS 2243 series* (which details the safe working practices that should be followed) are complementary.

3 Planning considerations. In the initial planning stage a brief should be prepared by the owner setting out in detail the work to be performed in the laboratory and the potential hazards involved (see Clause 1.5.1). In consultation with the designers of the laboratory, specifications should then be drawn up for the facilities and conditions needed to guard against these hazards, to enable a safe working environment to be provided and to protect the public. This Standard prescribes the facilities and conditions necessary to satisfy these requirements in the most commonly encountered laboratory situations.

4 Types of laboratories. This Standard is intended to apply to a wide range of different laboratories, it being recognized that common design principles apply to laboratories with quite different functions. Certain parts of this Standard apply particularly to the needs of chemical laboratories, but this does not exclude their relevance to other types.

Separate sections refer to the needs of biological laboratories, radiological laboratories and secondary school laboratories. These were included because of specific requests that they should be covered and because of the distinctive requirements that apply to such laboratories.

It is recognized that there are other types of laboratories which have distinctive requirements. If there are sufficient requests for other types of laboratories to be covered by this Standard, they may be included in a later edition.

5 Means of escape. Particular attention has been given to providing adequate means of escape from the building in the event of fire, containing the fire for a sufficient period to permit the evacuation of the occupants, to reducing the effects of fire, and to preventing its spread to other parts of the building.

6 Inspection and maintenance. Laboratories, after construction in accordance with this Standard, need to be inspected and maintained to ensure the specified level of performance throughout their working life, and to ensure the safety of the buildings and their occupants.

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* AS 2243 Safety in Laboratories.
Part 1: General.
Part 2: Chemical.
Part 3: Microbiology.
Part 4: Ionizing Radiations.
Part 5: Non-ionizing Radiation.
Part 6: Mechanical Aspects.
Part 7: Electrical Aspects.
Part 8: Fume Cupboards.

STANDARDS ASSOCIATION OF AUSTRALIA

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out requirements relating to the design and construction of buildings which house laboratories, as defined in Clause 1.4.21. It applies both to new laboratories and where existing buildings are converted to laboratory use, or to a different type of laboratory use. Special sections are included for biological, radiological and secondary schools' laboratories.

The Standard is not intended to apply to those laboratories which do not contain significant hazards such as those referred to in Clause 1.5.2.

Section 2 specifies matters which are recommended for inclusion or reference in Building Regulations. The other sections are in the form of design specifications or advice.

NOTES:

1. This Standard is primarily related to those aspects of laboratory building design which relate to the safety of the occupants. Various construction requirements are detailed which are intended to minimize the hazards associated with laboratories.
2. Not all possible hazards are covered in this Standard, and thus care is needed to ensure that all the problems applying to a particular laboratory are considered in the planning stage.
3. The design and construction of fume cupboards is excluded from this Standard since this is covered by AS 2243.8, but those aspects of fume cupboard design which affect the ventilation of the laboratory are included.
4. The provisions written in mandatory form (see Clause 1.4.31) are those which must be observed by any organization claiming or certifying compliance of a laboratory with this Standard. (See Clause 8.4.1.)

1.2 APPLICATION.

1.2.1 Relationship with other regulations. This Standard in Section 2 gives specific building requirements for laboratories. These requirements are additional to those in the applicable general building regulations, but have no legislative effect unless and until applied through those regulations.

NOTES:

1. The following types of regulations may also apply to laboratories. All laboratories must be checked for compliance with relevant regulations, and certificates obtained as necessary.
   (a) Health.
   (b) Labour and industrial safety.
   (c) Dangerous goods.
   (d) Plumbing.
   (e) Flammable liquids storage.
   (f) Electrical.
2. Where parts of this Standard are more detailed or more stringent than the applicable regulations and are not in conflict with them, then such parts of this Standard should be adopted in the design of the laboratory building.

1.2.2 Changes of use. Where a change of use of a laboratory is proposed, its suitability for the intended use should be fully checked against this Standard, and any necessary modifications of the building implemented.

1.2.3 Review of air recirculation system. Where an air recirculation system has been installed, (see Clause 6.2) a re-evaluation of the system shall be carried out whenever changes to the laboratory use are proposed.

1.3 REFERENCED DOCUMENTS. The Standards referred to in this Standard and other relevant Standards and documents are listed in Appendix A.

1.4 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

1.4.1 Air-handling system—a system for the purpose of providing air in a positive and controlled manner to specific enclosures by means of one or more air-handling plants, ducts, plenums, air-distribution devices and automatic controls.

NOTE: See AS 1668.2 for further definitions of types of air and air-handling systems.

1.4.2 Approved—approved by the local building authority or other relevant statutory authority.

1.4.3 Automatic fire suppression—the provision of the whole laboratory compartment and all sub-compartments, false ceiling spaces and similar permanent enclosures with either of the following:

(a) An automatic water sprinkler system in accordance with the principles expressed in AS 2118.

(b) Other approved fixed automatic fire detection and suppression system.

1.4.4 Contaminated (as applied to air)—containing harmful or hazardous concentrations of toxic, noxious, pathogenic, flammable, radioactive or other injurious matter, including dusts.

1.4.5 Corrosive—having the quality of damaging or destroying by direct chemical action. This also includes the effect of caustic substances.

1.4.6 Duct—either—

(a) a component part of an air-handling system, intended for the passage of air from one part of an air-handling system to another; or

(b) a shaft to carry reticulated services.

1.4.7 Exit—a building element consisting of any of the following:

(a) An internal or external stairway.

(b) A ramp.

(c) A fire-isolated passageway.

(d) A doorway opening to a road or open space.

The term also includes a combination of two or more such exits providing egress from a storey or a space in the nature of a storey to a road or open space.