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Australian STANDARD®

STANDARDS Australia

Laboratory design and construction



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- Australasian Fire and Emergency Service Authorities Council
- Australian Institute of Health & Safety
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Australian Standard®

Laboratory design and construction

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Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CH-026, Laboratory Safety and Design, to supersede AS/NZS 2982:2010.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this document as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this document is to specify requirements for the design and construction of laboratories, primarily on maximizing the safety of such facilities.

The major changes in this edition are as follows:

(a) New and revised terms and definitions (Clause 1.3).

(b) New section on laboratory planning and design (Section 2).

(c) New section on non-ionizing radiation laboratories (Section 11).

(d) New section on mobile laboratories (Section 13).

(e) New section on sustainable laboratory design (Section 14).

(f) New appendix (informative) on safety in laboratory design and construction (Appendix A).

(g) New appendix (normative) on design of radioisotope laboratories (Appendix B).

(h) New appendix (informative) on design of secondary school science teaching laboratories and preparation rooms (Appendix C).

(i) New appendix (informative) on design of mobile laboratories (Appendix D).

(j) New appendix (informative) on concepts of sustainable laboratory design (Appendix E).

(k) New appendix (informative) on automatic fire detection or protection devices for hazardous areas (Appendix F).

(l) Expanded Bibliography.

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Introduction

Laboratories play a crucial role across all sectors of the economy. They support operational and research activities in sectors such as pharmaceuticals, agriculture and food production, consumer goods, healthcare, education, energy, law enforcement, mining, manufacturing, environmental protection, and waste management.

Laboratories, whether fixed or mobile, are complex facilities with significant technical requirements. They accommodate advanced technologies, specialized equipment, and often hazardous materials and processes, making their planning and design a sophisticated process. This requires integrating cutting-edge scientific advancements, infrastructure, and adherence to stringent safety and regulatory requirements.

A number of different types of hazards can be encountered in laboratories, including the following:

(a) Biological hazards, such as infectious agents, allergens, and genotoxins.

(b) Chemical hazards, such as flammable, explosive, toxic, and corrosive substances, carcinogens, irritants, dusts, nanomaterials, compressed gases, and asphyxiants.

(c) Radiation hazards, such as ionizing and non-ionizing.

(d) Physical hazards, such as machinery or equipment in motion, noise, vibration, vacuum, pressurization, high-temperature processes and cryogenic liquids, and live electrical equipment.

(e) Electrical and electrochemical hazards, such as live equipment, static charge, and electrochemical systems and processes.

(f) Ergonomic and manual handling hazards, such as repetitive and fixed postures, slips and trips.

(g) Building hazards, such as ventilation, access, and waste disposal.

Laboratory design and construction is an essential process to ensure safe and healthy workplaces by addressing specific hazards, defining their nature and significance, and maximizing opportunities to eliminate them or mitigate risks. Effective design integrates functionality, infrastructure, and ergonomics, encompassing working spaces, storage, interior surfaces, water supply, ventilation, lighting, electricity, and outflows of waste, extracted air, and thermal load to ensure health, safety, well-being, property integrity, and environmental sustainability.

Environmental sustainability in laboratory design minimizes ecological footprints while maintaining safety, functionality, and resource efficiency. Adopting holistic approaches and innovative solutions assist to reduce environmental impact, enhances health, and supports scientific innovation and global sustainability goals.

This document provides requirements and guidance for the design, construction, and commissioning of laboratories to achieve functional performance while ensuring a safe workplace through the elimination of hazards and the minimization of residual risks to laboratory personnel and the public. The document recognizes that common design principles apply across diverse laboratory functions and also includes specific sections that address the additional requirements of biological, radiation, secondary school science teaching, and mobile laboratories.

This document supplements AS/NZS 2243 (all parts), which refers primarily to safe work practices in laboratories. However, AS/NZS 2243 also includes some design and construction requirements, particularly for specialized components (e.g. fume cupboards) and applications (e.g. physical containment). Reference to both this document and AS/NZS 2243 (all parts), and other applicable Standards, is recommended where laboratories are being planned or designed.

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Laboratory design and construction

Section 1 Scope and general

1.1 Scope

This document specifies requirements for the design and construction of laboratories.

Sections 1 to 8 apply to all laboratories. Sections 9, 10, 11, 12, and 13 contain additional requirements applicable to biological, ionizing radiation, non-ionizing radiation, secondary school science teaching, and mobile laboratories, respectively.

This document applies to new laboratories, new installations, and new work from the date of publication. For existing laboratories, this document may be used as guidance for risk-based improvements, particularly where significant refurbishment, change of use, or introduction of new hazards occurs, or where required by regulatory or contractual obligations.

NOTE 1 Refer to national, state and territory regulations, the National Construction Code (Class 8, Class 9a, Class 9b), requirements from government agencies responsible for biosecurity, gene technology and radiation, and relevant referenced standards.

NOTE 2 The term “laboratory” is sometimes applied to facilities such as computer rooms, mapping suites, and electronic workshops. In general, these facilities are not classed as laboratories covered by this document.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1319, *Safety signs for the occupational environment*

AS 1345, *Identification of the contents of pipes, conduits and ducts*

AS 1668.2, *The use of ventilation and airconditioning in buildings, Part 2: Mechanical ventilation in buildings*

AS 1668.4, *The use of ventilation and airconditioning in buildings, Part 4: Natural ventilation of buildings*

AS 1670 (all parts), *Fire detection, warning, control and intercom systems - System design, installation and commissioning*

AS 1735 (all parts), *Lifts, escalators and moving walks*

AS 1894, *The storage and handling of non-flammable cryogenic and refrigerated liquids*

AS 1940, *The storage and handling of flammable and combustible liquids*

AS 2243.5, *Safety in laboratories, Part 5: Non-ionizing radiations — Electromagnetic, sound and ultrasound*

AS 2243.9, *Safety in laboratories, Part 9: Recirculating fume cabinets*

AS 2252.2, *Controlled environments, Part 2: Biological safety cabinets Class II — Design*

AS 2714, *The storage and handling of organic peroxides*

AS 3780, *The storage and handling of corrosive substances*

AS 4326, *The storage and handling of oxidizing agents*

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