

Australian/New Zealand Standard™

**Laboratory design and construction**



## **AS/NZS 2982:2010**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD-046, Laboratory Design and Construction. It was approved on behalf of the Council of Standards Australia on 24 November 2009 and on behalf of the Council of Standards New Zealand on 22 February 2010. This Standard was published on 12 March 2010.

---

The following are represented on Committee BD-046:

Australasian Fire Authorities Council  
Australian Chamber of Commerce and Industry  
Australian Institute of Architects  
Commonwealth Department of Health and Ageing  
Commonwealth Scientific and Industrial Research Organization  
Engineers Australia  
Environmental Science and Research New Zealand  
National Measurement Institute  
New Zealand Institute of Architects  
Plumbing Products Industry Group  
The Royal Australian Chemical Institute  
Universities Australia

---

### **Keeping Standards up-to-date**

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at [www.saiglobal.com.au](http://www.saiglobal.com.au) or Standards New Zealand website at [www.standards.co.nz](http://www.standards.co.nz) and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

---

*This Standard was issued in draft form for comment as DR 09033.*

---

Australian/New Zealand Standard™

## Laboratory design and construction

Originally published in Australia as AS 2982—1987.  
Previous edition AS/NZS 2982.1:1997.  
Completely revised and redesignated as AS/NZS 2982:2010.

### **COPYRIGHT**

© Standards Australia/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6140

ISBN 978 0 7337 9421 6

## PREFACE

This Standard was prepared by the members of the Joint Standards Australia/Standards New Zealand Committee BD-046, Laboratory Design and Construction, to supersede AS/NZS 2982.1:1997, *Laboratory design and construction, Part 1: General requirements*. This Standard specifies requirements for the design and construction of laboratories based mainly on maximizing the safety of such facilities. Note that this is a single part Standard. The 'Part 1' title reference, included in the superseded standard, has now been dropped.

This Standard supplements the AS/NZS 2243 series, which refers mainly to safe working practices in laboratories. However, the AS/NZS 2243 series also includes some design and construction requirements particularly for specialized components (e.g. fume cupboards) and applications (e.g. physical containment). Reference to both AS/NZS 2982 and the AS/NZS 2243 series is recommended where laboratories are being assessed or planned.

This Standard is designed to help organizations responsible for commissioning and operating laboratories to provide a safe workplace. A laboratory must be designed, constructed, maintained and operated to minimize hazards and reduce risks to personal or public safety to an acceptable level.

While conformity to this Standard will enhance the safety of the workplace, disregard for safe working practices may negate the provisions for safety that are built into a laboratory. It is therefore essential that all personnel, including non-technical staff and visitors, be aware of and follow safe working procedures.

The Committee does not suggest that any of the provisions of this Standard are retrospective. However, users are encouraged to critically reassess their laboratories and adopt and implement those parts of this Standard that are cost effective and practicable and that can improve overall site safety.

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. Notes are also informative and for information and guidance.

## CONTENTS

	<i>Page</i>
FOREWORD.....	5
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE .....	6
1.2 DESIGN .....	6
1.3 REFERENCED DOCUMENTS .....	7
1.4 DEFINITIONS .....	8
SECTION 2 GENERAL LABORATORY CONSTRUCTION REQUIREMENTS	
2.1 SCOPE OF SECTION .....	15
2.2 PROTECTION AGAINST SUNLIGHT .....	15
2.3 STRUCTURAL INTEGRITY .....	15
2.4 CONSTRUCTION MATERIALS AND FINISHES .....	15
2.5 FLOORS.....	15
2.6 WALLS .....	16
2.7 CEILINGS.....	16
2.8 VENTILATION OPENINGS .....	16
2.9 BENCHES.....	16
2.10 AISLES .....	17
2.11 EGRESS AND ACCESS.....	18
2.12 SHELVING .....	18
2.13 FIXTURES, FITTINGS AND EQUIPMENT .....	18
2.14 FUME CUPBOARDS AND CABINETS.....	20
2.15 LUNCH ROOMS AND TOILET .....	20
2.16 WRITE UP AREAS.....	20
2.17 RESTRICTED ACCESS .....	20
2.18 WATER HEATERS .....	20
SECTION 3 RETICULATED SERVICES	
3.1 SCOPE OF SECTION .....	21
3.2 IDENTIFICATION AND COLOUR CODING .....	21
3.3 SERVICE ISOLATION.....	21
3.4 EMERGENCY SHUT OFF .....	21
3.5 EXPOSED SERVICE PIPES.....	21
3.6 PIPING IN CONCEALED SPACES .....	21
3.7 RETICULATION FROM GAS CYLINDERS.....	21
3.8 VACUUM RETICULATION .....	22
3.9 HYDRAULIC SERVICES .....	22
SECTION 4 ELECTRICAL SERVICES	
4.1 STANDARDS AND REGULATIONS.....	24
4.2 LABORATORY POWER .....	24
4.3 LABORATORY LIGHTING.....	24
SECTION 5 VENTILATION AND AIR QUALITY	
5.1 GENERAL .....	25
5.2 VENTILATION FOR OCCUPANTS.....	25
5.3 NATURAL VENTILATION.....	25
5.4 MECHANICAL VENTILATION.....	25

5.5	AIRBORNE CONTAMINANTS.....	26
5.6	LOCAL EXHAUST VENTILATION .....	26
5.7	VENTILATION FOR HAZARDOUS CHEMICAL STORES .....	27
<b>SECTION 6 HEALTH AND SAFETY REQUIREMENTS</b>		
6.1	GENERAL .....	29
6.2	SAFETY SHOWERS AND EYEWASHERS .....	29
6.3	HANDWASHING FACILITIES .....	29
6.4	SAFETY NOTICEBOARDS .....	30
6.5	SAFETY SIGNS.....	30
6.6	HAZARD SIGNS AND PLACARDS.....	30
6.7	ADDITIONAL REQUIREMENTS .....	30
<b>SECTION 7 STORAGE OF HAZARDOUS SUBSTANCES</b>		
7.1	GENERAL .....	31
7.2	FLAMMABLE LIQUIDS CABINETS.....	31
7.3	FLAMMABLE LIQUIDS STORES .....	31
7.4	COMPRESSED-GAS CYLINDERS .....	32
7.5	STORAGE AREAS FOR CORROSIVE MATERIAL .....	32
7.6	CHEMICAL STORAGE CABINETS .....	32
7.7	STORAGE FOR SOLID AND LIQUID WASTES .....	32
<b>SECTION 8 BIOLOGICAL LABORATORIES</b>		
8.1	SCOPE OF SECTION .....	33
8.2	LABORATORY LAYOUT .....	33
8.3	SECURITY.....	33
8.4	VENTILATION .....	33
8.5	STERILIZATION.....	33
8.6	BIOLOGICAL WASTE DISPOSAL .....	34
8.7	ANIMAL ACCOMMODATION FACILITIES .....	34
8.8	ADDITIONAL REQUIREMENTS FOR ANIMAL ACCOMMODATION .....	35
8.9	REQUIREMENTS FOR PLANT HOUSES.....	35
8.10	REQUIREMENTS FOR INVERTEBRATE FACILITIES .....	35
<b>SECTION 9 LABORATORIES IN WHICH RADIOACTIVE MATERIALS AND IONIZING RADIATIONS ARE USED</b>		
9.1	SCOPE OF SECTION .....	36
9.2	GENERAL .....	36
9.3	MINIMUM CRITERIA FOR RADIOISOTOPE LABORATORIES.....	38
9.4	SUMMARY OF DESIGN REQUIREMENTS .....	42
9.5	STORAGE OF RADIOACTIVE MATERIALS .....	42
<b>SECTION 10 SECONDARY SCHOOL LABORATORIES</b>		
10.1	SCOPE OF SECTION .....	45
10.2	RETICULATED SERVICES .....	45
10.3	ELECTRICAL SERVICES .....	45
10.4	HAZARDOUS MATERIALS .....	45
<b>APPENDIX A PLANNING, DESIGN AND CONSTRUCTION .....</b>		<b>47</b>

## FOREWORD

The Standard is intended to apply to a wide range of laboratories. It is recognized that certain common design principles apply to laboratories with quite different functions. Separate sections refer to the distinctive needs of biological, radiological, and secondary school laboratories.

A number of different types of hazards may be encountered in laboratories, including—

- (a) physical hazards including machinery or equipment in motion, parts under stress, noise, vibration, vacuum or pressurization;
- (b) flammable or explosive materials;
- (c) ignition sources;
- (c) temperature hazards including high temperature materials, cryogenic fluids;
- (d) electrical hazards including high voltages, live equipment, static charge;
- (e) chemical hazards including asphyxiants, oxidizers, carcinogens, toxins, sensitizing agents, corrosives, irritants and genotoxins;
- (f) biological hazards including infectious agents, allergens, irritants, genotoxins, zoonoses;
- (g) radiation including both ionizing and non-ionizing; and
- (h) ergonomic hazards, including repetitive and fixed postures, slips and trips.

Laboratory design and construction plays a fundamental and critical part in ensuring that laboratories are safe places to work. It is therefore necessary to consider in detail the type of hazards that apply to a particular laboratory and clearly define their nature and significance. This information is essential in order to maximize opportunities to eliminate hazards or to reduce risks to an acceptable level at the laboratory design and construction phase.

## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

**Australian/New Zealand Standard**  
**Laboratory design and construction**

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE**

This Standard specifies requirements for the design and construction of laboratories. Sections 1 to 7 apply to all laboratories. Sections 8, 9 and 10 contain additional requirements applicable to biological, radiological and secondary school laboratories respectively.

## NOTES:

- 1 This Standard is primarily intended for those aspects of laboratory building design and construction related to the safety of the occupants. Various design and construction requirements that are intended to minimize the hazards associated with laboratories are detailed.
- 2 This Standard should be used in conjunction with the applicable building regulations and other regulations such as those on occupational health and safety, and the relevant referenced Standards.

**1.2 DESIGN**

Laboratories shall be designed to address the many and varied requirements for safe operation and usage. The design process should include hazard identification, risk assessment and risk management to achieve safe and functional design.

NOTE: For guidance on the design and planning of laboratories, see Appendix A.

**1.3 REFERENCED DOCUMENTS**

The following documents are referred to in this Standard:

AS	
1216	Class labels for dangerous goods
1319	Safety signs for the occupational environment
1345	Identification of the contents of pipes, conduits and ducts
1482	Electrical equipment for explosive atmospheres—Protection by ventilation—Type of protection v
1558	The use of ventilation and airconditioning in buildings
1663.2	Part 2: Ventilation design for indoor air contaminant control
1735	Lifts, escalators and moving walks (series)
1894	The storage and handling of non-flammable cryogenic and refrigerated liquids
1940	The storage and handling of flammable and combustible liquids
2243	Safety in laboratories
2243.4	Part 4: Ionizing radiations
2243.6	Part 6: Mechanical aspects
2243.7	Part 7: Electrical aspects