

Australian Standard[®]

Guidelines for safe housing design



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 - Australian Glass and Glazing Association
 - Australian Institute of Building
 - Consumers Federation of Australia
 - Department of Housing New South Wales
 - Department of Human Services Victoria
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 - Master Builders Australia
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-

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Guidelines for safe housing design

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PREFACE

This Standard was prepared by the Standards Australia Committee CS-072, Safety in House Design, to supersede AS 4226—1994.

The objective of this Standard is to provide advice and recommendations on safe housing design for the use of owner/builders and contractors.

This Standard is not intended to be adopted into legislation. This document is for educational purposes.

This edition has been updated throughout to reflect changes in Australian Standards and in community needs and expectations. This Standard should be used in conjunction with the relevant materials and design Standards.

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FOREWORD

This Standard addresses the general safety requirements of people in relation to housing design. The specific requirements for children, older people and people with disabilities are addressed in other Australian Standards.

Many incidents in and around dwellings, that cause personal injuries, can be prevented by appropriate building design and selection and placing of fittings and equipment. This Standard provides general information on design, finishes and materials selected for use in the construction of dwellings with reference to safety.

This Standard covers issues of fire safety but does not apply to the protection of property against damage or protection of property from theft or personal injury by intruders.

For the purposes of this Standard, it is assumed that dwellings are constructed to a good trade standard, by licensed tradespersons as appropriate, and that fittings are installed in accordance with the manufacturer's requirements, the relevant Standards and the requirements of relevant government departments and local authorities.

STANDARDS AUSTRALIA

Australian Standard

Guidelines for safe housing design

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard provides guidelines for the design of safe dwellings. It describes design factors to be taken into account to reduce the likelihood of an injurious incident occurring in association with any building element or fitting, either alone or in association with other elements.

1.2 APPLICATION

1.2.1 Accommodation

This Standard applies to all dwellings, including apartments. Some of the items covered are relevant to public buildings and temporary accommodation. However, for requirements specific to adaptable housing, AS 4299 should be consulted.

1.2.2 Renovations

The principles discussed, and some of the recommendations made, in this Standard are also relevant to alterations of existing dwellings. Renovators should consider which, if any, of these principles and recommendations apply to the work they are undertaking.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1288	Glass in buildings—Selection and installation
1428	Design for access and mobility
1428.1	Part 1: General requirements for access—New building work
1851	Maintenance of fire protection systems and equipment
1926	Swimming pool safety
1926.1	Part 1: Fencing for swimming pools
1926.2	Part 2: Location of fencing for private swimming pools
2293.1	Part 1: Emergency escape lighting and exit signs for buildings—System design installation and operation
3000	Electrical installations—Buildings, structures and premises
3500	National plumbing and drainage code
3500.4.1	Part 4.1: Hot water supply systems—Performance requirements
3740	Waterproofing of wet areas within residential buildings
3786	Smoke alarms
4299	Adaptable housing
4685.1	Playground equipment—General safety requirements and test methods
HB 197	An introductory guide to the selection of slip resistant pedestrian surfaces

HB 230	Rainwater Tank Design and Installation Handbook
AS/NZS	
1249	Children's nightwear and limited daywear having reduced fire hazard
1170.1	Part 1: Structural design actions—Permanent, imposed and other actions
2918	Domestic solid fuel burning appliances—Installation
3500.4	Part 4: Plumbing and drainage—Heated water services
4422	Playground surfacing—Specifications, requirements and test method

1.4 INTERPRETATION

A check should be made with the relevant local authority for modifications to the recommendations made in this Standard.

1.5 DEFINITIONS

For the purposes of this Standard, the definitions below apply.

1.5.1 Accident

An incident causing unintentional personal injury.

1.5.2 Baluster

One of a series of intermediate vertical elements supporting a rail or coping to form part of a balustrade.

1.5.3 Balustrade

A railing or coping, supported on balusters, to form a barrier at the open side of a stair, ramp, elevated platform, landing, balcony or parapet.

1.5.4 Dwelling/house

A building or part of a building designed for, or occupied as, a residence for one or more independent households.

1.5.5 Glare

Visual discomfort or impairment of vision experienced when objects within the field of view (e.g. lamps, luminaires) are excessively bright in relation to the general surroundings.

1.5.6 Grabrail

A rail used to steady or stabilize a person engaged in a particular action.

1.5.7 Handrail

Horizontal, inclined or vertical member, usually part of a railing system, normally grasped by hand for guidance or support. Handrails are generally located about waist height and can form part of a safety rail. They form the top of the balustrade on the open sides of landings, elevated platforms or walkways.

1.5.8 Incident

An unplanned event that may or may not result in harm.

1.5.9 Nosing

The front, usually rounded edge of a stair tread. It may project over the riser below it.

1.5.10 Pitch

The inclination of any part of a building, such as a ramp or stair, to the horizontal plane.

1.5.11 Pitch line

An imaginary line drawn through the nosings of a stair, from which measurements such as angle, headroom and handrail height are taken.

1.5.12 Ramp

A slope formed to overcome differences in level.

1.5.13 Should

Indicates a recommended practice.

1.5.14 Slip-resistant

Able to reduce the likelihood of a person slipping.

NOTE: This word is generally used to refer to flooring materials that help to prevent slipping in both wet and dry conditions.

1.5.15 Spa pool

A water-retaining structure fitted with filtration and sanitizing equipment, a heater, equipment for creating turbulent water and a skimmer system. The structure, except for maintenance purposes, is normally filled with water.

1.5.16 Swimming pool

Any excavation or structure containing water to a depth greater than 300 mm and used primarily for swimming, wading, paddling or the like, including a bathing or wading pool or a spa.

1.5.17 Water storage tanks

Tank designed for the storage of rainwater.

SECTION 2 SITE PLANNING

2.1 GENERAL

This section provides recommendations for the design of dwellings intended for specific sites. These recommendations are also relevant when builders or others are evaluating the suitability of packaged designs or prefabricated units for specific sites.

2.2 PROTECTION OF ENTRIES

Entries to the dwelling should be located so that they are sheltered from prevailing winds and inclement weather. Inclement weather also increases the possibility of doors slamming on persons, which may cause fingers to be jammed. Where possible, steps and unnecessary changes in floor level should be avoided.

2.3 CHILDREN'S OUTDOOR PLAY SPACES

Sooner or later most dwellings are likely to be visited by a small child or to have a small child living in them for an extended time. Poor planning at the initial design stage may make it impossible for a satisfactory play space to be created. Fixed playground equipment and surrounding surfaces should comply with AS 4685 and AS/NZS 4422.

In planning an outdoor area suitable for children to play in, the following should be considered:

- (a) Sun and shade.
- (b) Shelter from the wind.
- (c) Ground slope and sudden changes in ground level, such as retaining walls.
- (d) Drainage.
- (e) Visibility from the house, particularly from the principal work areas, such as the kitchen, and from the site where the telephone is located.
- (f) Separation from water hazards.
- (g) Separation from a garden shed or tool shed.
- (h) Separation from the rubbish storage area.
- (i) Separation from the vehicle manoeuvring area and parking spaces.
- (j) Fencing for swimming pools in accordance with AS 1926.
- (k) Any projections and protrusions from the dwelling that may cause injury.
- (l) Separation from any areas where there are chemicals, pesticides, treated timber or toxic plants.
- (m) Location of play equipment to avoid impact injuries from falls.

2.4 VEHICLE ACCESS

2.4.1 Parking

Garaging, parking spaces and driveways should be separated from children's play spaces and be fenced off from them.

2.4.2 Enclosed garages

Garages connected directly to the dwelling via an access doorway may cause a health hazard as a result of toxic exhaust fumes entering the dwelling even when the connecting door is closed. If the garage is attached to the dwelling, precautions will similarly be required to prevent the entry of such fumes.

2.4.3 Accessibility

Consideration should be given to providing enough space around the vehicle to allow the vehicle doors to be fully opened, e.g. to assist children into child restraints.

2.4.4 Manoeuvring

Vehicle manoeuvring routes should be identified. It is desirable that vehicles be driven on and off the site in a forward direction.

2.4.5 Visibility

Vehicle crossings of kerbs and footpaths should allow an unobstructed view of pedestrians on footpaths and vehicle and bicycle traffic on roads.

2.4.6 Approach

Vehicle crossings of kerbs and footpaths should allow a vehicle to approach the road or footpath with reasonable caution. Where practicable, there should be a level area at least 3 m, and preferably 5 m, long at the end of a sloping driveway to allow a vehicle to pause safely before crossing a footpath.

2.5 EXTERIOR STAIRS, PATHS AND PAVING

2.5.1 Gradients

The gradient of exterior paths should not be steeper 1 in 14 and should have a slip-resistant finish.

Sloping exterior surfaces should be clearly distinguishable from level surfaces and be slip-resistant. A vertical element such as a lighting post or handrail is a valuable cue to the existence of a change in slope.

2.5.2 Run-off

Exterior paved surfaces should be graded to shed water. The recommended fall is 1:100.

2.5.3 Surface finish

Exterior steps should have a slip-resistant finish.

In areas where snow, ice or frost may occur, surface slip resistance will be significantly impaired and handrails should be considered even for level or gently sloping surfaces.

2.5.4 Handrails

For the benefit of people with reduced mobility, exterior steps or ramps with a gradient steeper than 1 in 20 should be provided with a secure handrail 865 mm–1000 mm above the gradient or the pitch line of the steps or ramp surface.

NOTE: For the design of handrails, see Clause 11.5.

2.5.5 Headroom

Paths should not be placed under outward-opening windows, shutters or awnings, or other protruding fixtures, unless a head clearance of 2 m has been allowed.

2.5.6 Entry landing

Entrance steps should be provided with a landing at the entry level and be constructed to allow for the incorporation of a child-resistant gate to allow at least 1000 mm of landing length at the top and bottom of the stairs/steps.

2.5.7 Flights

Unnecessary changes in levels should be avoided. Where steps are required, they should be grouped in flights of three or more steps. Single steps are difficult to see and should not be used. The number of changes of direction between flights of stairs should be minimized. Refer to Section 11 for design recommendations.

The building design should avoid incorporating unnecessary steps.

2.5.8 Risers

The steps in any flight should have a consistent riser height.

2.5.9 Visibility

The nosings of exterior steps should be distinguished by some clearly visible means, e.g., the use of a contrasting or reflective coating or warning strips.

2.6 EXTERIOR LIGHTING

2.6.1 General

Dispersed light sources are preferred. Intense light sources should be avoided except for security lighting, as they may cause glare and cast deep shadows onto surfaces.

Consideration should be given to the inclusion of sensor lights.

2.6.2 Paths and accessways

Exterior accessible paths of travel should be lit where possible, especially exterior steps. Lighting of paths, ramps and steps should deliver a minimum of 50 lux at ground level and be uniform.

2.6.3 Steps

Exterior lighting for steps should direct lighting on the treads, preferably from below handrail level.

2.6.4 Car parking

Lighting between the dwelling and parking and garaging should be controlled by two-way switching or movement sensors.

2.6.5 Open spaces

The space between the parking or garaging area and the entrance to the dwelling should be adequately illuminated.

2.7 SWIMMING AND SPA POOLS

2.7.1 Fencing

All private outdoor swimming and spa pools, or pools deeper than 300 mm used for swimming or paddling, should be fenced so as to restrict access by young children to the immediate pool surround. Fences and gates should comply with AS 1926.1 and AS 1926.2 and relevant State regulations.

Fences, self-closing hinges and latches should be maintained in good working order as required by local authorities.

2.7.2 Restricted access

Consideration should be given to restricting child access to any structure or excavation capable of containing water, e.g. fish ponds, open drains, waterways, bushland and the like.

2.7.3 Indoor pools

Any room containing an indoor pool, including a spa pool, should have child-resistant, self-closing and self-latching doors with controls set at not less than 1200 mm from the finished floor level.

2.8 EXTERIOR BALCONIES, STEPS, DECKINGS AND TERRACES

Where the fall height is 450 mm or greater, there should be a balustrade designed to prevent climbing by children and incorporating a handrail at least 1000 mm high.

2.9 WING WALLS AND OTHER FEATURES

The design of wing walls and other features should be carefully detailed to discourage climbing by children.

2.10 OTHER OUTSIDE AMENITIES

Barbecues and incinerators should not be accessible to young children while in operation.

NOTE: It is essential that children be supervised at all times to prevent injuries from occurring.

A lockable shed or lockable outdoor storage should be provided for toxic or flammable materials and gardening implements. The door should have a latch located not less than 1.5 m above ground level and should have a keyed lock.

NOTE: Material Safety Data Sheets should be kept with each substance.

2.11 ATTACHMENTS TO HOUSES

2.11.1 General

Any attachments to houses should be designed and installed to be sufficiently robust to carry the imposed loads. These loads should anticipate unusual loading such as might be imposed by persons using the attachment to hang on to, swing on, climb on or stand on, that is, use the equipment for purposes not intended. Advice should be sought from an appropriate person, such as a structural engineer, an architect, a building designer or a builder, as to the ability of the structure to carry the imposed loads and the most appropriate fixing method.

2.11.2 Basketball rings

Basketball rings and backboards should be mounted in accordance with the guidelines published by the Basketball Association. These installations should be able to support the weight of a person dropping the ball into and holding onto the ring while slam-dunking, as persons performing this manoeuvre will inevitably swing on the ring. Before the ring/backboard is attached, it is important to check that the proposed supporting structure is suitable for the task. Single-skin unreinforced brickwork or masonry is not suitable, because single-skin masonry walls are not designed to carry an out-of-plane load.

Masonry used in domestic construction is generally not suitable for out-of-plane loadings that are exerted on the wall via any element fixed to the wall. A masonry element that is expected to be under the influence of an external force causing an out-of-plane reaction should be further investigated and designed accordingly by an appropriately qualified person.

Ideally, in normal suburban backyards, a ring and backboard should be fixed to a hot dip galvanized steel post of 90 mm × 90 mm with a 5 mm wall thickness. The post should be set at least 800 mm into a mass concrete footing of 500 mm × 500 mm (or 500 mm diameter) by 1 m deep. Alternative systems can be provided by a structural engineer or by the equipment manufacturer.

The stability of a post, brick wall or any other supporting structure should be checked regularly, as it can deteriorate over time. It should also be ensured that water does not pond at the post-footing connection or get inside any steel post as it may lead to corrosion. This is especially important in saltwater environments.

NOTES:

- 1 Supervision of children is an essential factor in injury prevention; for example, parents or other responsible adults should inform children of the dangers of swinging on or hanging off a basketball ring.
- 2 A brochure detailing the safety requirements for basketball rings and backboards can be obtained from the Australian Competition and Consumers Commission through www.accc.gov.au

2.11.3 Water tanks

Rainwater tanks should be installed in accordance with HB 230, *Rainwater Tank Design and Installation Handbook*, published by Standards Australia. Rainwater tanks should be structurally sound regardless of the amount of water stored within.

The location of water tanks should be identified by means of a plaque within the main electrical meter box.

Underground tanks should be clearly identified with a service marker.

Do not place heavy objects or loads on top of the water tanks. Do not drive vehicles over underground water tanks unless the tanks are designed to carry such loads.

Unless the tanks are designed and constructed appropriately, such activities may cause damage to the tank or pipework or may cause the tank to collapse or dislodge a lid, which may allow children, adults or animals to fall into the tank.

2.11.3.1 Cleaning and access requirements

Rainwater tank access covers should be secured in place to prevent unintentional entry. Where the access cover has been removed (e.g. during tank service, testing, cleaning or maintenance), do not leave the access opening unattended.

Do not enter the tank. When required, employ the services of personnel specifically trained to enter and work in confined spaces, who is familiar with the relevant occupational health and safety regulations.

NOTE: Rainwater tanks are potentially hazardous because:

- (a) They may have an atmosphere that contains deadly levels of contaminants.
- (b) They may have an oxygen deficiency or excess.
- (c) A person can be trapped in a tank and drown.

2.12 ROOF CAVITY AND SUBFLOOR AREAS

These areas should be designed to provide adequate and permanent natural ventilation.

NOTE: Be aware that under certain conditions these may be considered to be confined spaces under occupational health and safety regulations. If these spaces are not ventilated, access to confined spaces should be restricted to persons trained and accredited to perform this task.

2.13 GARBAGE CHUTES

Garbage chutes present increased hazards, particularly for young children. Where they are installed, they should—

- (a) have a self-closing cover with a child-resistant latch;
- (b) be large enough to prevent a child becoming entrapped;
- (c) have an outlet that is positioned to prevent injury from falling articles;
- (d) discharge into an area that children cannot access (to prevent children from climbing up the chute);
- (e) be designed to prevent intruders gaining access into the house; and
- (f) be designed with adequate ventilation and to allow the necessary cleaning and maintenance.