

Most accidents occur in the home, but good building design can help achieve a much safer and healthier living environment. The location of a house, construction methods, materials, finishes, appliances and maintenance all influence home safety. Incremental improvements to occupant health and safety can be achieved at every stage of the building design and construction process.

KITCHEN DESIGN

The majority of domestic accidents occur in the kitchen and bathroom.

Apply the following general design tips to reduce the likelihood of accidents.

Design for unobstructed access to the work triangle (the area containing the stove, sink and refrigerator).

Eliminate or reduce cross traffic through the work triangle.

Protect hot plates with a guardrail or deep setback and use fire resistant finishes adjacent to and above the cook top.

Round-off bench edges and corners.

Design heatproof benchtops or inserts either side of oven and grill for rapid set down of hot dishes and trays.

Locate microwave ovens above the eye level of children or at back of a bench to prevent them gazing into it. Have the microwave checked regularly for microwave leakage.

BATHROOM DESIGN

Use slip resistant flooring and avoid steps.

Provide handles and bars near baths, in showers and adjacent to toilets for elderly and disabled users.

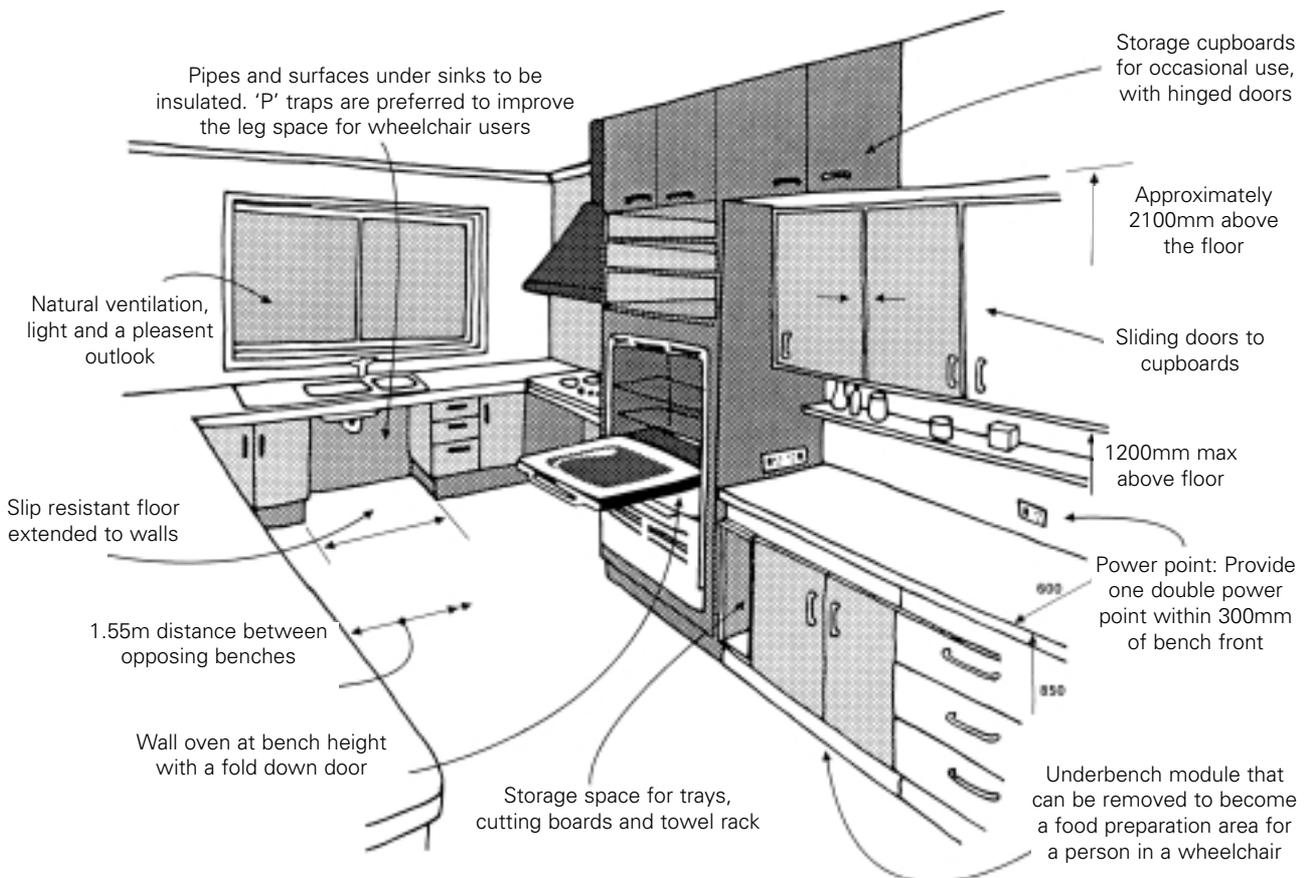
Design and install child resistant cabinets for medicines and hazardous substances.

Comply with Australian Standards that specify minimum distances between water sources (baths, basins, tubs) and power points.

Comply with Building Code of Australia (BCA) requirements for outward opening WC doors or hinges that can be removed from the outside. Many heart attacks occur in WCs with the victim blocking inward opening doors.

Ensure that privacy locks on bathroom doors can be opened from the outside in the case of an emergency.

Provide a night light or movement sensitive light switch in the passage for safe access to the toilet at night.



FITTINGS

HOT WATER

Instantaneous hot water systems should have their thermostats set at 50°C or less to help prevent scalding.

Hot-water storage systems should be set to at 60°C to inhibit growth of harmful bacteria such as legionella. Incorporate a fail-safe mixing valve on both the bath and shower to avoid scalding. [See: Hot Water Service]

Install a tempering valve or an outlet shut-off valve in your existing system to reduce the flow of water to a trickle if it's too hot. When cold water is added and the temperature becomes safe, the valve opens and the flow returns to normal. This can prevent accidents if you have small children or elderly people in your home.

DOORS

Install self-closing (but not self-locking) screen doors at external entrances.

Internal door handles should be 1metre from the floor so young children cannot open them.

Consider latch rather than knob type handles for ease of use by weak or disabled people.

WINDOWS

Design windows with easy access for opening, closing and cleaning. Windows should not be able to be opened any more than 100mm by a young child. Grade A safety glazing material should be used for glass up to 1500mm from the floor. Full-length glass panels should be clearly marked.

Ensure that all new glazing complies with relevant Australian standards and bears a manufacturer's stamp certifying compliance.

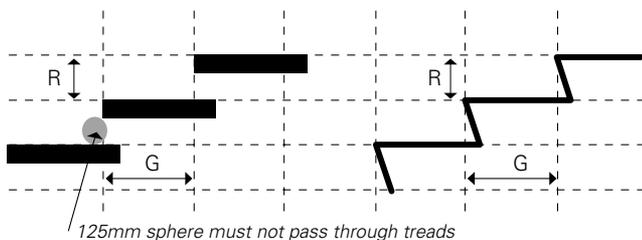
FLOORS, STAIRS AND RAMPS

Use ramps instead of stairs where possible.

Observe optimum rise to run ratios for stairs as shown in the following graph:

STAIR RISER AND GOING DIMENSIONS (mm)

Stair type	Riser (R) (see figure below)		Going (G) (see figure below)		Slope relationship (2R+G)	
	MAX	MIN	MAX	MIN	MAX	MIN
Stairs (other than spiral)	190	115	355	240	700	550
Spiral	220	140	370	210	680	590



Source: Building Code of Australia

Ensure that stair rails and balustrades comply with BCA minimum standards. Rails should be at least 1metre above finished floor level with a maximum 125mm gap between balustrades.

Avoid changes of level within the house and between the house and the outside. Where changes of level are necessary, ensure that they are clearly visible with colour change in floor covering.



Use non-slip, impact absorbing floor surfaces where possible, especially on stairs or ramps and in wet areas.

WIRING AND ELECTRICAL

Carefully plan the provision of power outlets. Insist on an electrical layout plan. It will save you later inconvenience and may save your life.

Install earth leakage devices and circuit breakers to all power outlets.

Provide adequate power points and circuits. This eliminates the need for power boards, which can overload circuitry. It also reduces the need for cords to trail across walkways, where they can trip or electrocute.

Ensure that the switchboard can be easily accessed at night. Safety switches should be used on indoor and outdoor circuits.

HEATERS

Ensure fan heaters have a safety switch to cut power off if the fan stops or heater overheats.

Never leave a heater unattended.

Position the heater to avoid intake blockage or material falling on it.

Pets may lie close to heaters and accidentally knock bedding, mats and other materials onto the heater.

CEILING FANS

Position ceiling fans at least 2.4m above floor level to reduce risk of injury.

DESIGNING FOR THE ELDERLY AND DISABLED

Elderly or disabled people may be at greater risk of accidents in the home.

Following appropriate design guidelines can reduce the risk of accidents.

Minimise the number of steps or changes of level to reduce the risk of falls. Where steps are unavoidable the riser height should be consistent.

Avoid gravel, slippery or unevenly paved paths.

Paths should be direct and have adequate natural and artificial light. Two-way switches or movement sensors should be used to control lighting.

Use contrasting colours on steps and path edges to improve visibility.

Install handrails beside main walkways, steps and ramps.

Reduce the need to bend or stoop by designing appropriate storage and utility areas.

Provide security measures that are easy to operate.

Install smoke detectors and emergency lights in bedrooms, hallways and main living areas.

Install a light switch and telephone near the bed.

Reduce the need for maintenance inside and outside the home and ensure that unavoidable maintenance tasks can be undertaken safely.

Modify showers to measure at least 900mm x 1200mm. They should not have any steps or be located over a bath. Solid walls on two sides are preferred to allow horizontal grab rails to be fitted. Shower curtains or hinged shower screens are easier to use than sliding doors.

Install grab handles for showers and baths.

OUTDOOR AREA DESIGN

Plant light coloured plants along the edges of paths to make them clearer at night.

Provide solar powered or movement sensitive outdoor lighting along paths, especially near steps or bends. Use energy efficient lighting. [\[See: Lighting\]](#)

Provide safety fencing around pools and ponds in accordance with BCA and state regulations to prevent access by unsupervised children.

SECURITY

Install an intruder alarm system according to the Australian Standard (AS 2201.1, *Intruder alarm systems Part 1: Systems installed in client's premises*).

Display security system notices prominently.

Select a security system with low standby power consumption. Many systems use excessive electrical energy over a year. [\[See: Energy Use Introduction\]](#)

Design or modify your home to eliminate dark corners, narrow pedestrian walkways and hidden recesses.

Design balconies and windows to maximise natural observation of vehicle and pedestrian movement.

Ensure that perimeter doors and windows are of solid construction and fitted with quality deadlocking devices.

Glass should be reinforced with shatter resistant material to prevent entry.

Ensure that skylights and roofing tiles can not be easily removed from the outside.

Fit the main entry doors with viewing ports to allow identification of visitors.

Direct infra-red activated security lights toward likely access/egress areas to illuminate potential offenders.

Avoid or modify trees, carports and lattices that can act as 'ladders' to upper storeys.

Ensure that external storage areas, laundries, letterboxes and communal areas are well lit and observable from inside.

Clearly delineate property boundaries using gardens, distinctive paving, lawn strips, ramps and fences.

Fences and walls should be low and/or open to improve observation and maximise sunlight. Vegetation should not obscure building entrances, windows and other vulnerable areas.

Ensure that entrances are clearly private and well illuminated.

Install sensor lighting or timed lighting that can be controlled from within the dwelling.

Join or establish Community Safe House programs in your area.

Provide pleasant, well-defined pedestrian routes overlooked by neighbouring houses and employ traffic calming measures to slow cars and encourage pedestrian activity where possible. [\[See: Streets & Communities; Transport\]](#)

Set buildings back from the verge to create a perception of semi-private space.

Encourage casual use of public and semi-private open spaces during evening hours so they can be 'animated' with legitimate activities.

FIRE RISK AND PREVENTION

House fires and bushfire damage can often be prevented through careful design and maintenance.

HOUSE FIRES

Use fire resistant materials, linings and finishes, particularly in kitchens.

Install smoke alarms and regularly ensure that batteries are fitted correctly and still charged.

Equip the home with fire extinguishers.

Consider installing a domestic sprinkler system.

Favour furnishings and floor coverings with fire retardant properties. Ratings are available for many items and include flammability indexes, spread of flame indexes and smoke generated indexes. Various construction systems have fire ratings that determine how long they will withstand a fire and retain structural integrity. Ask your Council for full details.

BUSHFIRES

To protect your home from bushfires in high risk areas:

Position the home on flat ground if possible. Flat ground is safer than sloping ground and gentle slopes are safer than steep slopes. Fire travels and burns much faster uphill than downhill. The bottom of a long slope is safer than the top.

Create an area of reduced fuel between the house and the direction from which bush fires usually approach. Where possible, take advantage of existing fuel-free zones such as roadways, rivers or bare ground to provide a fuel break between your home and any unmanaged grass or bushland. (Councils will advise on fuel free zones).

Establish a wind-break of high-moisture-content trees on the hazardous side of your site (eg Cheese Tree, Pittosporum, Blueberry Ash, Rose Wood, Christmas Bush, Coachwood, Brush Box, Lilly Pilly, etc). This will also help shield your home from radiated heat and flying sparks and embers.

Design the exterior of your home to avoid creating hard-to-get-at spots where debris, such as leaves and twigs can get trapped on the roof, against the walls or under the floor. These spots are likely to trap embers during a fire and are often the source of structural fires when the accumulated debris ignites.

Build on a reinforced concrete slab on level sites. Where the site is on a slope, it may be environmentally preferable to build on posts to minimise site disruption. The floor should be non-flammable and rest on non-flammable supports, and the space between the ground and the floor should be enclosed. Timber should not be used at ground level.

A one-pitch roof is the easiest type to protect against bush fire.

Install double-glazing. It reduces the chance of implosion of windows in severe fires by as much as 50 percent.

Purchase and install plugs to allow flooding of gutters in times of fire. Water overflow from gutters can give some extra protection.

Fit ember proof leaf guards to gutters. Many houses catch fire after embers slide off a roof igniting dry leaves in gutters.

Store all flammable material such as wood piles or petrol containers away from the house.

Ensure that access for fire fighters is clear and check that domestic hoses and taps are in working order.

ADDITIONAL KEY REFERENCES

Kogarah Council (1999). *Better Home Design Guide*. Residential Development Control Plan.

Rural Fire Service Websites. eg.
<http://www.bushfire.nsw.gov.au/main.htm>