
Safe movement and access

Safe movement and access to and within a building are a necessary requirement for health and amenity. Reference to the BCA is the most effective means of collecting information on construction methods relating to safe movement and access. Practically, this relates to safety from falling, and access to swimming pools. The objective of the BCA in providing performance provisions relating to safe movement and access is to:

- a) provide safe access to and within a building for all persons,
- b) protect children from injury or drowning in a swimming pool, and
- c) protect people from injury from a swimming pool water recirculation system.

Read the Performance Requirements for safe movement and access in Volume 2 of the BCA, Clauses P2.5.1 to P2.5.4.

Acceptable construction practice for *Safe Movement and Access* is covered in the BCA in four sections:

- stair construction
- barriers and handrails
- swimming pool access
- swimming pool water reticulation systems

in Part 3.9.

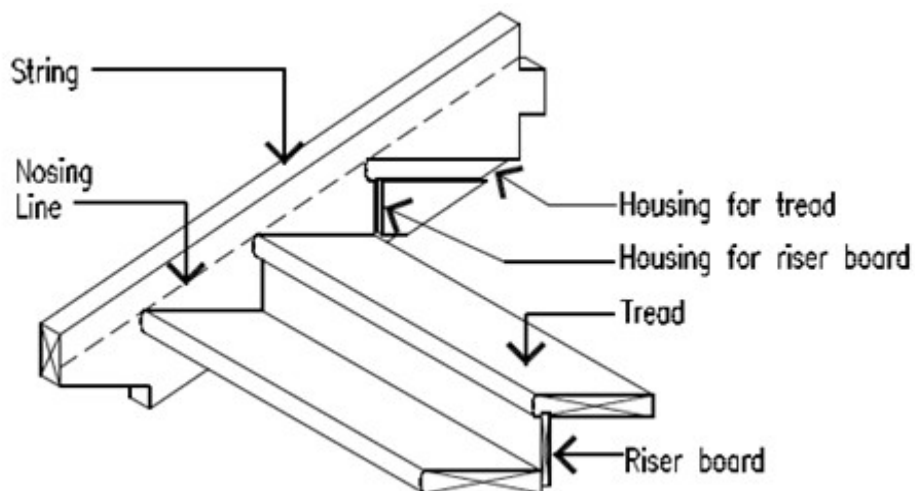
Stair construction

Stairs can be defined as a series of steps, with or without landings, that forms a stairway and provides access on foot from one storey or level in a building or structure to another. A stairway is a way up by means of a sloping, stepped structure leading from one storey or level to another above or below, and including landings, newel posts, handrails and balustrades.

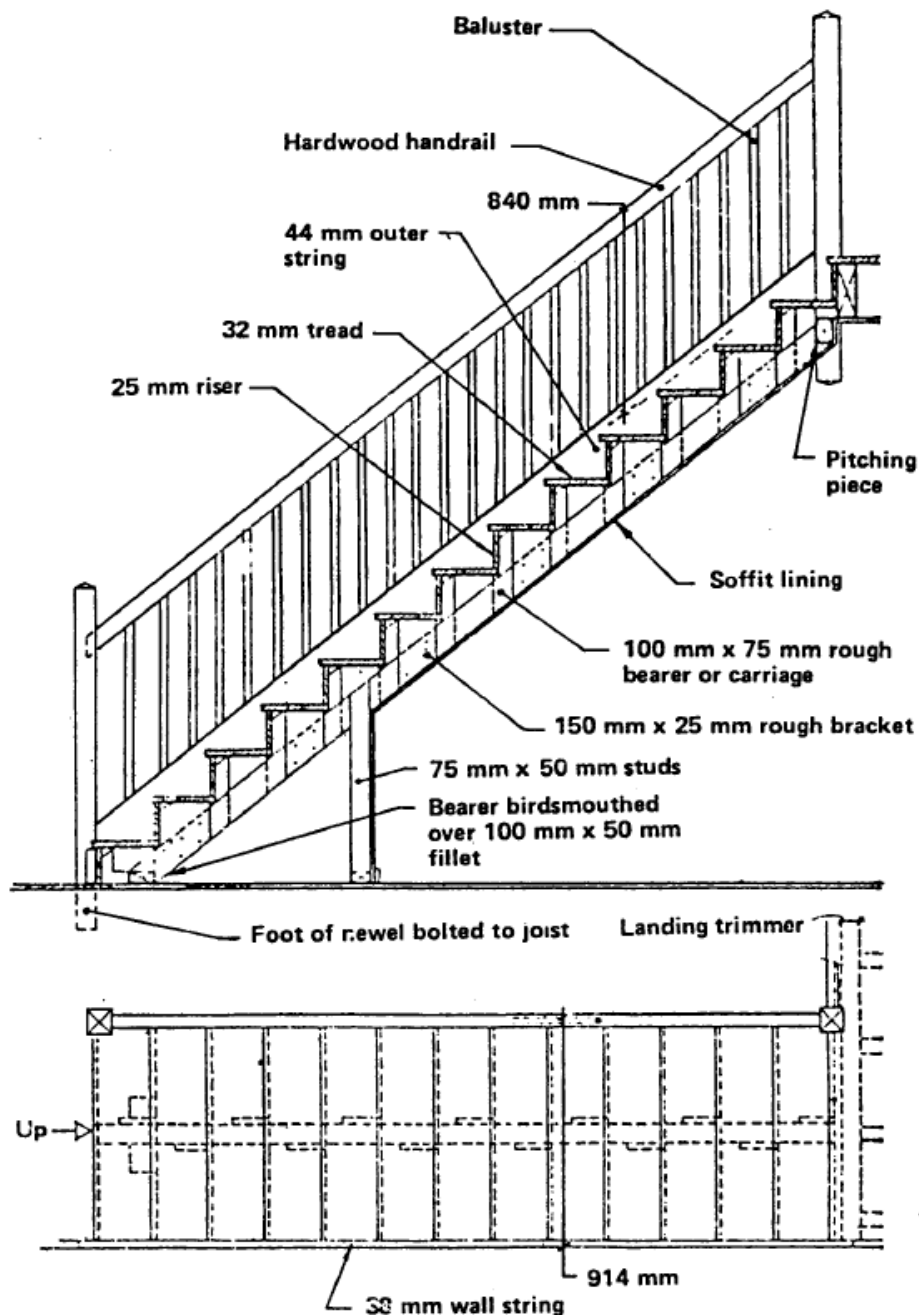
Staircase terms

- **baluster** - a vertical member supporting a handrail and forming part of the balustrade.
- **balustrade** - a series of balusters supporting a handrail at the open side of the stair, ramp, elevated platform, landing, balcony or the like.

- **riser** - the vertical or inclined face of a step in a stair flight.
- **going** - the horizontal distance from the face of one riser to that of the next, measured on the walking line.
- **tread** - the horizontal upper surface of a step in a stair on which the foot is placed.
- **landing** - a level platform at the top of, or in between two flights of stairs.
- **newel post** - a post at the top and bottom of a stair flight, or at a point of change of direction, to support the ends of the handrail, balustrade, and outer string.
- **nosing** - a semi-circular or rounded projecting part of the stair tread.
- **handrail** - a horizontal or sloping rail which forms a safety rail to guard the side of a stairway, walkway, landing or the like. Handrails form the top of the balustrade.
- **winders** - a triangular or wedge shaped tread of a step used in winding, curved or angled stairs to change the direction of the stair.
- **string** - an inclined timber member supporting the treads and risers.



Basic stair construction



A typical stair construction detail

BCA Requirements

The *deemed to satisfy* requirements for stair construction depend upon whether the stairs serve habitable or non-habitable rooms. Stairs which serve non-habitable rooms may use the BCA acceptable construction practices or *AS 1657 Fixed platforms, walkways, stairways and ladders — Design, construction and installation*.

Part 3.9 of the BCA focuses on safe movement and access in buildings, in particular, parts 3.9.1 - Stair Construction and 3.9.2 – Barriers and Handrails. It is a very important that you read and become familiar with these parts of the BCA.

Part 3.9.1.3 focuses primarily on the requirements for stair construction. Generally the limitations relate to dimensional sizes or methods of construction. For example:

- limit of no more than 18 and no less than 2 risers,
- treads must be of solid construction if more than 10 meters high or connecting more than three storeys,
- goings and risers must be of consistent dimensions through the flight,
- the riser must not allow a 125mm sphere to pass through between treads,
- have a limit of 3 winders in lieu of each quarter landing or 6 winders in lieu of each half landing,
- treads must have a slip resistant finish, and
- have requirements for landings as specified.

When a staircase is designed for a domestic building, careful consideration must be given to the correct ratio of riser to going (or in other words the inclination of the flight of stairs). If the risers are too large the stairs will be too steep and if the going is too small a person won't be able to fit their foot on the tread.

Part 3.9.1.4 of the BCA lays down specific dimensional requirements for the construction of stairs which must be adhered to.

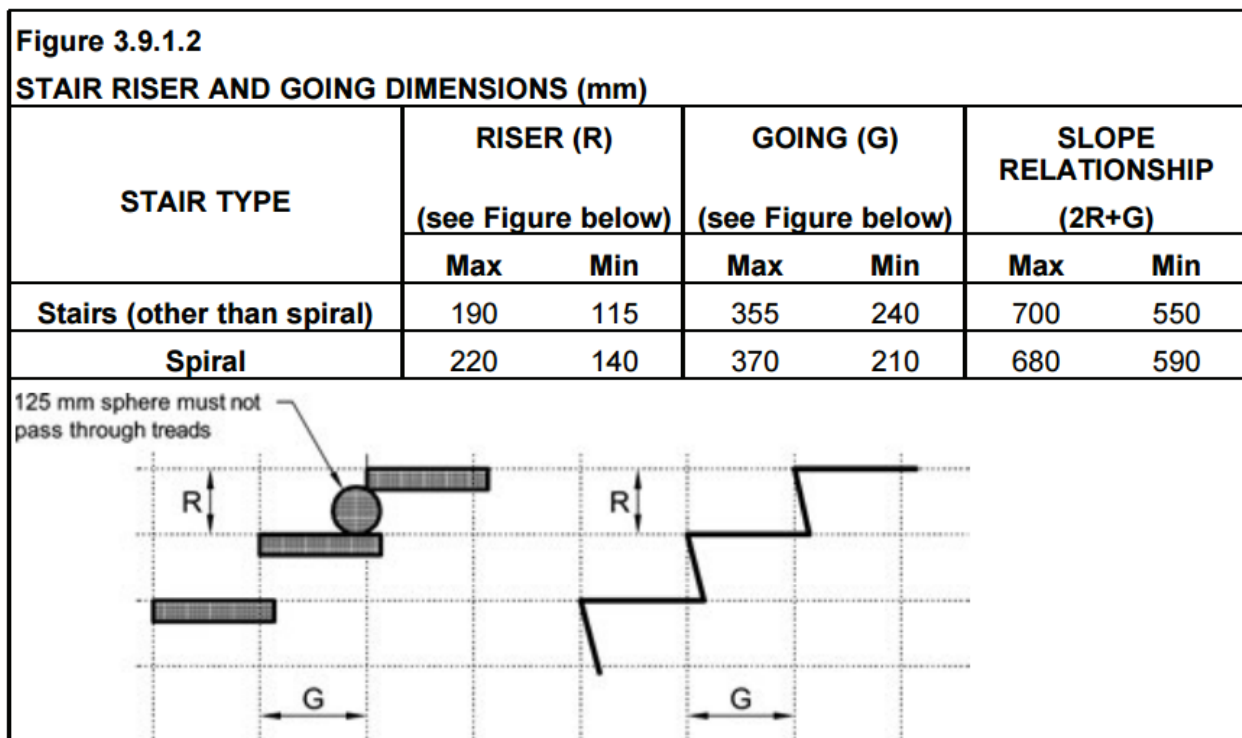


Figure 3.9.1.2 from the BCA Volume 2

Angle of inclination

The angle of inclination of the flight must be comfortable and within the limits imposed by the BCA. The BCA states that the riser can be between 115 mm and 190 mm, and the going between 240 and 355 mm for a stairway in a residential building. However the quantity 'twice the riser plus the going' ($2R + G$) must be not more than 700 mm and not less than 550 mm.

The flight of a staircase must not be less than 2 risers, or more than 18 risers. If your flight of stairs has more than 18 risers, then you must include a landing.

For more information on stair construction, read *Building Your Own Home*, Section 64 Stairs and Entry, *The Australian House Building Manual*, Topic 6 Stair Construction, and Chapter 14 Stairs & Balustrades in *Acceptable Standards of Construction Class 1 & Class 10 Buildings*.

Barriers and handrails

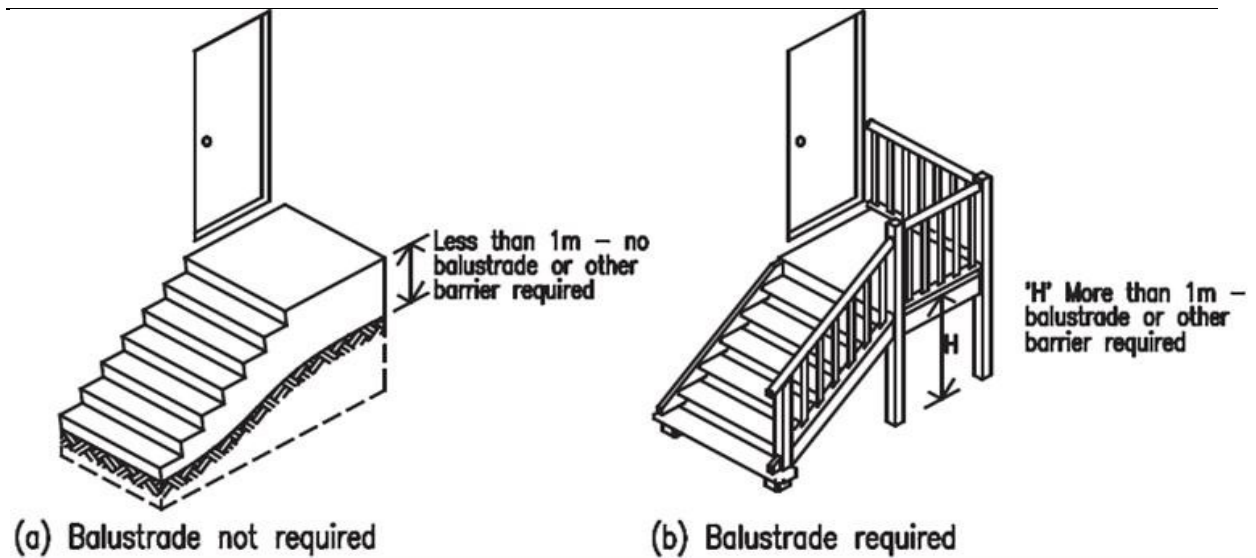
Barriers and handrails provide protection from falls or from access to swimming pools.

Barriers are required to be provided where there is the possibility of falling:

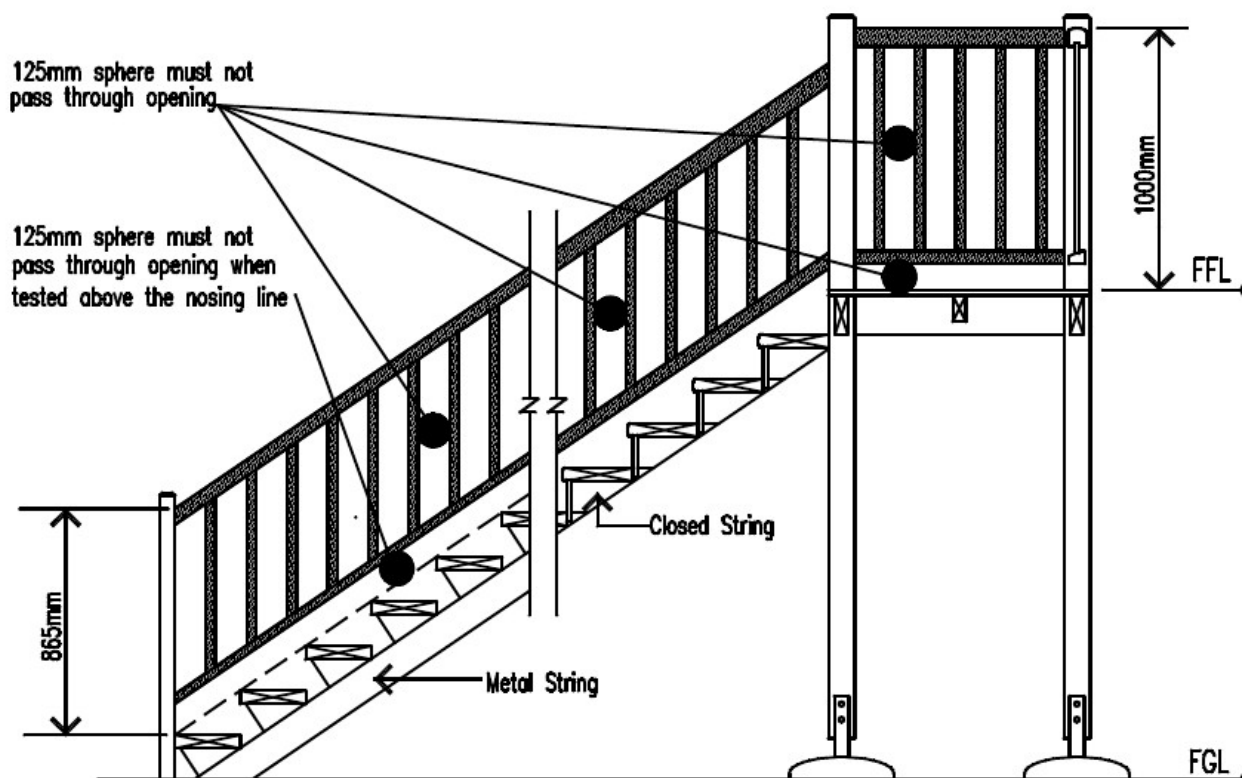
- 1 m or more due to a sudden change in level such as through an opening in the external wall, from a roof, or from a floor, or from some other sudden change in height associated with a building,
- 2 m or more from a floor through an openable window in a bedroom, or
- 4 m or more from a floor through any other openable window.

Such barriers must be:

- continuous for the full extent of the hazard,
- of a height to protect people from falling,
- sturdy enough to prevent falls through the barrier, including from impact, and from the pressure of many people pressing against it, and
- able to prevent the passage of children.



Where barriers are required for external stairs



Restrictions on the size of openings to prevent children falling

Special consideration must also be given to wire balustrades which must be constructed in accordance with part 3.9.2.3(f).

The BCA describes DTS provisions for barriers and handrails in Part 3.9.2. Read this section very carefully now and then answer the questions below.

1. The rear entry to a building is 1.4 m above natural ground level. A concrete landing and stairs are provided to the door and one side of the stairway is bounded by the

wall of the house; the other side falls to a garden bed. Is a barrier required to the landing? Is a barrier required to the stairs?

2. For the stair described in 1. provide the following details:
 - a. The minimum height of the barrier above the stair tread level
 - b. The minimum height of the barrier on the landing
 - c. The maximum size of any openings in and under the barriers
 - d. Is a handrail required for the stairs?
 - e. Is a handrail required for the landing?
3. There have been several instances of children falling from windows in residential buildings. Briefly list the requirements for a window where the floor in the room is a). less than 2 m above the ground beneath, and b). 2.5 m above the ground beneath.
4. Why are there special requirements for barriers constructed with wire systems?

(answers at the end of the section)

Swimming pool access

Swimming pool barriers are a topic of some contention due to the number of child drownings that occur every year in Australia.

In NSW, the Swimming Pools Act 1992 and the Swimming Pools Regulation 2008, applicable to swimming pools with a depth of water of more than 300 mm, regulate the circumstances in which a barrier is required. Safety barriers installed in accordance with *AS 1926 Swimming pool safety Part 1 Safety barriers for swimming pools and Part 2 Location of safety barriers for swimming pools* fulfil the performance requirements of the BCA.

Different regulations apply in different states and territories. In Queensland, restriction of access to swimming pools is regulated under the Building Act, 1975. In Western Australia, it is the Building Act 2011 and the building Regulations 2012 that apply.

You should read Part 3.9.3 of the BCA Volume 2.

Swimming pool water reticulation systems

Read Part 3.9.4 of the BCA Volume 2.

Answers to questions within this topic

1. A **continuous** barrier must be provided along the side of the landing **and** stairway where the height of the landing is more than 1.0 m above the ground level as is the case with this example.

2. For the stair in Q1,
 - a. The height of the barrier must be not less than 865 mm above the stair treads,
 - b. The height of the barrier on the landing must be not less than 1 m above the floor of the landing,
 - c. The maximum size of any openings must not allow a sphere of 125 mm to pass through it,
 - d. A handrail is required for the stairs on at least one side of the flight,
 - e. A handrail is not required for the landing.

3. A window opening must be provided with protection if the floor below the window in a bedroom is 2 m or more above the surface beneath.
 - a. Where the floor level below an openable window is less than 2 m there are no specific requirements,
 - b. Where the floor level below an openable window is more than 2 m above the surface beneath, then the windows are required to be able to restrict the passage of a 125 mm sphere, and resist a horizontal outward force of 250N, using a device or a screen. When a child-resistant release mechanism is to be used for a screen, a barrier not less than 865 mm high is required to the window with no horizontal elements that can facilitate climbing. If the openable part of the window is at least 1.7 m above the floor, no further protection is required.

4. There are specific requirements for tension of wire systems used as barriers, and for maximum deflection, because of the ability of tensioned wire to relax over time, and because there is the ability of wires to deflect; hence, in order to meet the requirements of restricting the passage of a 125 mm sphere, and maintaining the ability to prevent falls, wire barriers must meet the requirements detailed in Part 3.9.2.3.