HIA Guide to the Building Code of Australia - Housing Provisions

Here is an extract from the HIA Guide to the Building Code Of Australia relating to staircases. This handy guide, published by HIA is designed to simplify and explain Volume Two of the Building Code of Australia (BCA) - The Housing Provisions. It should be read in conjunction with the latest Building Code of Australia.

Warning:

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Part 3.9.1

Stair

Construction

GENERAL

The BCA has a requirement that all people should be able to move around a building safely.

Generally all houses will have some form of stairs or steps, either internally or externally. The BCA is only concerned with stairs related directly to the building.

The stair dimensions defined in the BCA have been determined by studies that have observed the way people walk up and down stairs. These studies have identified step distances that allow a person to negotiate a stair in comfort.

Accordingly, stairs designed and constructed in accordance with these requirements will provide a safe method for moving from one level to another.

APPROPRIATE PERFORMANCE REQUIREMENTS

For the purpose of this Part, the Performance Requirements are defined in P2.5 of Section 2.

The intention is to provide a building that will enable people to safely move between the different levels of the building using stairs or ramps.

If a performance design approach is used the designer should provide some details to support that a person can use the stairs comfortably and in a safe manner.

ACCEPTABLE CONSTRUCTION MANUALS

As there is no Acceptable Construction Manual applicable to this Part, compliance with this part of the BCA must be either performance based, or in accordance with the Acceptable Construction Practice outlined below.

ACCEPTABLE CONSTRUCTION PRACTICE

Definitions

This clause contains a number of definitions that apply to this Part. The definitions help explain the meaning to words or terms that are italicised. eg. *flight.*

Further reference can be made to definitions contained in Part 1.1 Interpretation. These definitions are contained in Part 1.1 as they are applicable to more than a single Part of the Acceptable Construction section of the BCA.

Application

In order to use this Acceptable Construction Practice, the proposed design and construction must not be outside the limitations specified within this clause. Points worth noting in the Acceptable Construction Practice are: *BCA 3.9.1.1*

Generally the limitations relate to dimensional sizes or methods of construction. For example if the proposed design was to have:

A. more than 18 risers, **OR**

B. have more than three winders in a 1/4 landing, OR

C. have a riser opening greater than 125mm, **OR**

D. have a going less than 240mm for a straight flight of steps,

Then it would not comply with the requirements of the Acceptable Construction Practice. The proposed design would then have to meet the Performance requirements.

Non-Habitable Rooms

If the proposed design has a stairway to a *non-habitable* room, then you may choose to design the stairs in accordance with this Part, or alternatively with AS 1657.The use of AS 1657 is ideal if there is limited space and/or the room will not be regularly used. *BCA 3.9.1.2*

This Standard allows a steeper stair to be built and is usually used to design access stairs for maintenance areas on buildings. In many ways the stair built to AS 1657 could be considered to be a step ladder with handrails.

Construction of Stairs

The requirement for the construction of stairs and landings is described in this clause. There are important conditions in this clause and it is worthwhile understanding the limitations. For instance, a stair must have no more than 18 steps in a flight. This is intended to ensure people negotiate a limited number of steps before a landing is installed so they can have rest. *BCA 3.9.1.3*

It must be remembered that stairs will be used by people of all ages including the young and elderly, so the design must meet their requirements.

Sub-clause (b) allows the going of the winders to either 1/4 or 1/2 landings to differ from the remainder of the flight. However the going of the winders must be consistent - you cannot vary them individually.

If a stair construction results in the potential for a person to fall more than 1.0m, then a balustrade will be needed.

Risers and Goings

The dimensional requirements for risers (the distance between the steps) and goings (the width of the step) are provided in this clause.

It is important to always check the slope relationship of 2R+G once you have determined the rise and going. This is simply doubling the riser height and then adding the going dimension and checking the result against the maximum or minimum figures shown in the table of Figure 3.9.1.2. If your result is not within these figures, then you will have to alter either the rise or the going.

The slope relationship is a formula used to determine if the stair will be comfortable to use. If you do not meet this ratio you will have to redesign the stair or have it approved under performance.

The going measurement in a straight flight of stairs can be taken at any point. However, where the treads are tapered, as in a circular or curved stair, then the measurement is taken at a nominated point at the centre or at the sides of the stair (depending on the width).

For spiral stairs the point of measurement is a distance of 7/10ths from the outside face of the centre support. (Divide the unobstructed width by 10 and then multiply the result by 7).

Remember the unobstructed width for tapered stairs is the measurement between the inside face of the handrails, or the stringers if there is no handrail (the stair is bounded by a wall).

Ramps

BCA - Volume 2 - Housing Provisions does not provide any requirements for the design or construction of ramps. However, Volume 1 does provide some requirements and these may assist as a guide in the designing or construction process.

It is important to note that as these are not part of the Housing Provisions, then there is no requirement to comply with them. They are provided as a guide only.

- **BCA - Volume 2, Part D 2.10** In this Part the maximum gradient of a ramp should not exceed 1:8 and the floor surface must have a non-slip surface.
- AS **1428.1-2001 - Design for Access and Mobility, General requirements for access – New building work.**

  Useful guide if the occupants are disabled, then this Standard provides the maximum length of ramps as well as gradients.

  If balustrades or barriers are required to the sides of the ramp, then these need to comply with BCA - Volume 2 - Housing Provisions, Part 3.9.2 Balustrades

Part 3.9.2

Balustrades

GENERAL

This Part sets out the requirements for the location size and height of barriers that will allow a person to move around a building without falling.

APPROPRIATE PERFORMANCE REQUIREMENTS

For the purpose of this Part, the Performance Requirements are defined in P2.1 and P2.5 of Section 2.

The intention is to provide a barrier to prevent a person from falling where there is a difference in floor levels of 1.0m or more. The barrier should be constructed so a person could not fall over or through it and at the same time restrict a child crawling through the balustrade. In addition, the barrier should be strong enough not to collapse should a person fall or lean against it.

ACCEPTABLE CONSTRUCTION MANUALS

As there is no Acceptable Construction Manual applicable to this Part, compliance with this part of the BCA must be either performance based, or in accordance with the Acceptable Construction Practice outlined below.

ACCEPTABLE CONSTRUCTION PRACTICE

Application

In order to use this Acceptable Construction Practice, the proposed design and construction must not be outside the limitations specified within this clause. *BCA 3.9.2.1*

Points worth noting when using the Acceptable Construction Practice are that the provisions generally relate to dimensional sizes and design loads for barrier construction. If you plan to use a barrier outside these requirements, for example if the proposed design were to have openings greater than 125mm, then it would be outside the limitations of the Acceptable Construction Practice and need to be approved as an Alternative Solution.

When balustrades or other barriers are required

This clause tells you when to install a barrier to prevent a person from falling.

Window openings do not need to have a barrier. However, it is worthwhile noting that the glazing to any window opening would need to comply with BCA Part 3.6 and this includes requirements for human impact resistance. *BCA 3.9.2.2*

The measurement for the height of the balustrade or barrier is measured from the finished floor surface. Finishes such as ceramic tiles and even carpet can make a significant difference to the finished floor height and the builder must make allowance for these factors when constructing the barrier to ensure the overall height of the barrier is not reduced by the adjoining floor finish.

Balustrades or other barrier construction

This clause contains information on the minimum height and maximum size of any openings for barriers.

The Australian Standard AS 1170.1 nominated in this clause requires a balustrade or barrier to be structurally adequate to withstand a point load of 0.6kN (kilo newtons) and an evenly distributed load of 0.4kN/m applied inward, outward or downward on the handrail.

These design loads are intended to ensure that the barrier is rigid enough to withstand a person falling against it without collapsing (point load), and be suitably rigid and strong enough not to collapse should people lean against the barrier (distributed load). The handrail must also withstand wind loads but this generally would only be applicable where a solid panel, such as glazing, is used externally.

To better understand what a point load of 0.6kN is, consider that an average person can exert a horizontal load of 0.45kN. Applying this type of test may assist in the assessment of whether the balustrade or barrier has been fixed to the building correctly. In situations where a barrier is installed where a person could fall more than 4m, then the balustrade or barrier must be constructed so that people, including a child cannot climb over it. This provision applies to horizontal elements in areas between 150mm and 760mm (as measured from the floor).

A solution to this requirement is to have either vertical members, spaced no more than the maximum opening, or have a solid panel.