

UNIVERSAL DESIGN: TRIP AVOIDANCE

INTRODUCTION

Trips can occur when a person unexpectedly catches their foot on an object or surface. Common causes of tripping include low obstacles, obstructed view, poor lighting, uneven walking surfaces and poor maintenance.

Trips causing a person to lose balance and fall may lead to serious injury and hospitalisation. Statutory requirements are met by complying with Deemed-to-Satisfy provisions which focus on prevention of trips in critical areas.

Qualitative guidelines complement these requirements by offering possible design solutions.

STANDARDS

The National Construction Code (NCC) requires safe movement to and within buildings for all people. Trip prevention is implicitly addressed by the Deemed-to-Satisfy provisions for stair construction under BCA D3D14. A stairway must have no less than 2 risers in each flight for a person to observe and adjust to a change in level. It must also have constant goings and risers, i.e. with a variation of no greater than 5 mm, to minimise the risk of people overstepping during descent or stumbling on ascent due to variations in the tread and riser dimensions.

Going, riser and quantity dimensions for public and private stairways are also outlined under the same clause. The Deemed-to-Satisfy dimensions are 115 to 190 mm for risers and 240 (for private stairways) or 250 (for public stairways) to 355 mm for goings.

The NCC (2022) also notes that the threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf under BCA D3D16. Exceptions apply in certain instances.

The *ABCB Livable Housing Standards*, cited by BCA G7 and BCA H8, require Class 1a buildings and Class 2 sole occupancy units to have a hobless and step-free entry to at least one shower in the dwelling. Class 1a buildings must also have a continuous, step-free access path to the dwelling entrance door.

AS 1428.1 outlines requirements for accessible design including provision of continuous accessible paths of travel and circulation spaces, tolerances for abutment of adjoining surfaces, setbacks for stairs to avoid tactile indicators protruding into the path of travel and a minimum luminance contrast of 30% for adjoining elements to highlight changes in level and materials.

AS 4299 provides guidelines for designing adaptable housing. One key performance requirement of adaptable housing is the avoidance of level changes, i.e. to have no steps and to avoid level changes where possible. Design solutions include provision of an accessible pathway compliant with AS 1428.1, a low-level threshold at the entry door, a hobless shower and achieving a minimum lux level of 150 lux throughout internal areas.

APPLICATION OF UNIVERSAL DESIGN

How can universal design be applied to trip avoidance?

- Provide an intuitive access path and maintain a clear line of sight, where possible. Avoid sudden changes in height, level and direction.
- Aim for step-free and unimpeded access between spaces. Provide smooth transitions between abutting surfaces. Plan and detail any transitions and their locations.
- Determine stair riser and going dimensions based on ease of use and location in addition to regulatory requirements.
- Allow for appropriate setbacks to avoid protrusions into the path of travel. Identify and highlight any potential hazards.
- Improve lighting levels and/or quality. Provide dimmer switches which allow variable illumination levels to assist with visual acuity.
- Consider handrails on both sides of internal stairs.
- Provide hobless showers.
- Provide an adequate number of general-purpose socket outlets in logical locations to minimise trailing cords on the floor.



Universal design

Universal design is the design of buildings, products or environments to make them accessible and usable to all people of different ages and abilities over time, without the need for adaptation or specialised design.

Relevant standards

NCC (2022) Volume One

- BCA D3D14 *Goings and risers*.
- BCA D3D16 *Thresholds*.
- BCA G7 *Livable housing design*.

NCC (2022) Volume Two

- BCA H5D2 *Stairway and ramp construction*.
- BCA H8 *Livable housing design*.

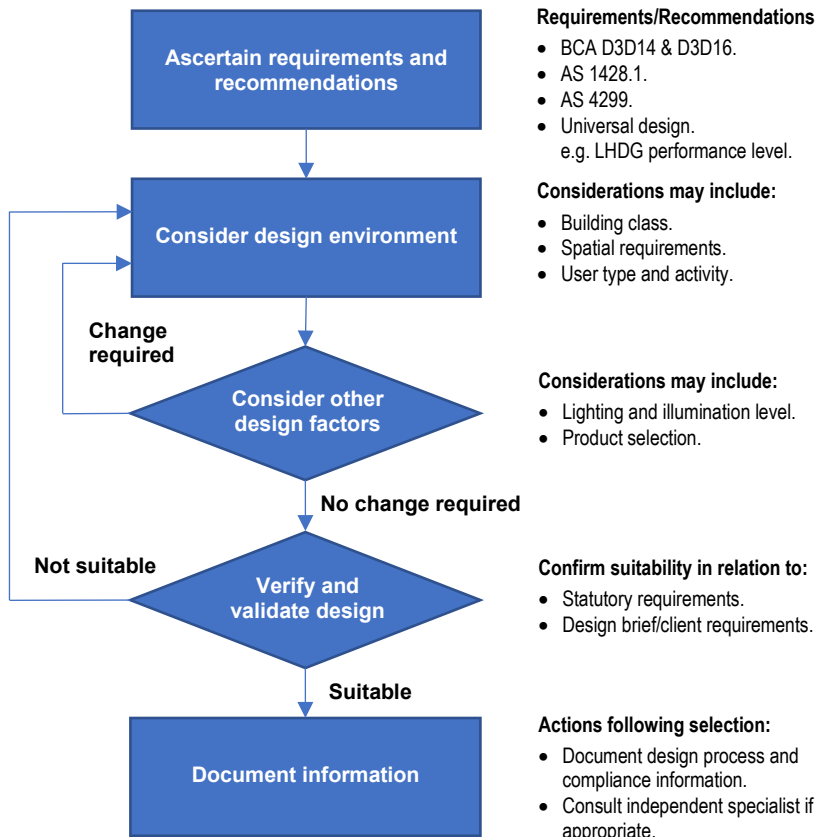
AS 1428.1 *Design for access and mobility - General requirements for access - New building work*.

AS 4299 *Adaptable housing*.

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DESIGN PROCESS

What actions should a designer take?



Relevant documents

Livable Housing Design Guidelines, Livable Housing Australia

NATSPEC TECHnotes

- DES 037 Accessible housing
- DES 038 Universal design: Introduction
- DES 039 Universal design: Slip resistance
- DES 042 Universal design: Lighting
- DES 043 Universal design: Wayfinding
- DES 046 Universal design: Acoustics

Relevant worksections

- 0262 External sports and playground surfacing
- 0274 Concrete pavement
- 0275 Paving - mortar and adhesive bed
- 0276 Paving - sand bed
- 0277 Pavement ancillaries
- 0279 Paving - on pedestals
- 0282 Pathways and cycleways (Construction)
- 0310 Concrete – combined
- 0314 Concrete in situ
- 0315 Concrete finishes
- 0383 Decking, sheet and panel flooring
- 0541 Access floors
- 0612 Cementitious toppings
- 0613 Terrazzo in situ
- 0631 Ceramic tiling
- 0632 Stone and terrazzo tiling
- 0651 Resilient finishes
- 0654 Multilayered board flooring
- 0655 Timber flooring
- 0656 Floor sanding and finishing
- 0657 Resin based seamless flooring

OTHER CONSIDERATIONS

The designer should also consider the following:

- Materials can vary in durability. Investigate the durability of the products before confirming their selection. Consider if parts are likely to break or wear away creating uneven floor surfaces, and whether mat or carpet surfaces are likely to compress over time leading to issues at junctions.
- Materials can fade over time. Select products which are UV stable and will maintain sufficient luminance contrast with other building elements.
- Shared or public areas are likely to be maintained by a facilities management company. Facilities may not be managed around the clock (in the event of damage, spills, etc). Insufficient lighting or lighting which is replaced infrequently may hinder users from identifying a potential trip hazard.
- Elimination of stairs and level changes may be unfeasible on certain sites.
- Building elements at low level such kerbs and wheelstops can be easily unnoticed. Consider if it may be appropriate to highlight these elements to reduce the possibility of trips.