

Over the Threshold

Specifying Door Sills for Universal Access, Functionality and Performance



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INTRODUCTION

As the Australian population ages, architects, designers and specifiers face an important challenge going forward – providing universal access. According to 2017 statistics published by the Australian Institute of Health and Welfare, 15% of Australians (3.8 million) were aged 65 or over,¹ a proportion that is rapidly increasing. In addition, the Australian Network on Disability notes that 4.4 million people in Australia have some form of disability.²

Universal access, referring to the design and specification of spaces so that they can be accessed and understood by all people regardless of their age, size, ability or disability,³ benefits society as a whole. Accessible spaces promote the dignity, respect and wellbeing of older-aged Australians and people with disabilities and/or mobility issues. In healthcare and aged-care environments, accessibility enables a wide range of users to make maximum use of facilities to achieve positive health and wellbeing outcomes.

It is also a question of economics and sustainability – buildings that are not designed with built-in accessibility for all will require periodic retrofitting, a practice that is costly and has an ongoing impact on the environment.

Against this backdrop, architects, designers and specifiers play an important role in making universal access a reality with carefully-selected, functional and fit-for-purpose design solutions. To do so, design professionals need to be aware of the relevant accessibility regulations and design standards and how they apply in practice. They must also ensure all aspects of the building design are considered for accessibility, while balancing concerns for performance, functionality and longevity.

In this whitepaper we look at the design standards and regulations applying to door sills with a focus on accessibility, compliance with AS1428.1 and other performance categories. In doing so, we provide architects, designers and specifiers a concise guide to specifying high performing door sills for inclusive environments.

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THE IMPORTANCE OF DOOR SILLS AND THRESHOLDS

Exterior doors serve as entry points for the general public and must accommodate a wide range of users. “Sills” refer to the component of the door frame sitting on the bottom, directly on the foundation of the floor. “Door threshold” is the sloped cross section that extends across the bottom of the door area. “Sill” and “threshold” are sometimes used interchangeably.

Beyond enabling access to indoor spaces, door sills and thresholds on exterior doors fulfil a variety of other purposes. Sills provide weather protection by creating a seal underneath the door to protect against water, heat, cold air and other elements

entering the building. By reducing the gap between the bottom of the door and the floor, sills also act as a form of pest control by keeping small pests and insects from entering indoors.

Well-specified sills and thresholds also contribute to building energy efficiency. The seal underneath the door acts as a barrier preventing interior air from leaking out. Excess air leakage requires additional artificial heating and cooling to keep the building at a comfortable temperature in turn increasing energy costs and impact on the environment.

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AS1428.1-2009 “CONTINUOUS PATH OF TRAVEL”

GENERAL DESIGN REQUIREMENTS

The minimum design requirements for new building work to enable access for people with disabilities is found in *AS1428.1-2009 Design for Access and Mobility*, which sets out the general requirements for access for new building work. An overarching requirement is that new buildings must have continuous paths of travel for people who use wheelchairs or have other mobility issues. “Continuous path of travel” means an “uninterrupted route to or within a premises or a building which provides access to all services and facilities.”⁴

Door thresholds at entrances often present access problems for wheelchair users and users who have difficulty lifting their feet.⁵ A threshold ramp should be used to help navigate level changes and provide easy, comfortable access to all users. Under AS 1428.1, threshold ramps must have a maximum slope of 1:8, a maximum length of 280 mm and a maximum rise of 35 mm. AS 1428.1 also specifies requirements for slip resistance and minimum changes in level where one surface meets another.

Care should be taken to avoid features that could impede access for users with a disability or mobility issues, including users who

use walking aids. For example, insufficient circulation space will make navigating doors difficult for wheelchair users. Wheelchair users will also find it difficult operating a door if there is insufficient landing space to enable the wheelchair to come to rest. Trip hazards, such as protruding corner tiles, pose a greater risk to users with ambulant difficulties or impaired vision.

OPERATIONAL FORCE AND DOOR CONTROLS

Consideration must also be given to users of varying levels of physical strength and ability. Under AS1428.1, door controls forming part of the continuous path of travel must comply with Clause 13.5. This section outlines the design and performance requirements of door handles and other related hardware. The purpose of this section is to ensure the ease-of-operation of door systems covered by the Standard.

Some notable requirements include specification of door controls that enable one-hand operation and “D” type handles for sliding doors. The Standard also specifies the maximum amount of operational force needed to operate a door system, which cannot be in excess of 20 Newtons.





Northcote Home Extension, Melbourne – Alspec ProGlide UltraFlat

DOOR SILL SPECIFICATION: ACCESSIBILITY WITH PERFORMANCE

COMPLYING WITH AS1428.1-2009

The challenge for designers and specifiers is meeting the requirements in AS1428.1 without compromising on water and air infiltration performance. Door sills that comply with AS1428.1 may not meet the minimum Water Penetration Resistance in *AS2047-2014 Windows and external glazed doors in buildings*, the mandatory minimum specification for windows and doors. If this is the case, designers and specifiers must consider alternative solutions.

Sills with drainage systems balance accessibility with protection against water ingress. Some products feature a self-draining design that prevents water from penetrating past the seal. Clause 7.5 of AS1428.1 requires drainage grates to meet certain criteria:⁶

- Circular openings must not be more than 13 mm in diameter.
- Slotted openings must not be more than 13 mm wide and must not run in the same direction as travel.
- Sills with openings greater than 13mm wide will not be compliant.

Some door systems also have difficulty meeting operational force requirements. Designers and specifiers should confirm that the door system has been independently tested to meet the requirements for operational force as well as air infiltration and water penetration. The results of these tests will determine the performance and durability of the system given the specific site conditions. Reference should be made to *AS2047-2014 Windows and external glazed doors in buildings*, which sets out design and performance requirements for external windows, sliding and swinging glazed doors..

In relation to door controls, some types of door handles and hardware will be difficult for older aged users or users with a disability to operate. Avoid round door handles and locks with small snibs as their operation is dependent on a certain degree of grip strength and dexterity.⁷ Leading door system suppliers can support the use of a range of door controls that are compliant with access standards and eliminate pinch points.

OTHER DESIGN CONSIDERATIONS

Energy efficiency

The National Construction Code includes requirements for thermal performance and energy efficiency. Door sills that do not provide an adequate seal to prevent air from leaking out of the house contribute to inefficient buildings.⁸

Acoustic performance

Acoustic performance of door systems is typically dependent on air leakage and material selection.⁹ Effective acoustic sealing around the perimeter of a door will help manage sound transfer into the building.

Flyscreens

Flyscreens may be required depending on project requirements. Flyscreens provide several benefits, from effective pest control to increased air ventilation within a building. There are a wide range of flyscreen solutions on the market, varying in material and mesh size, to suit different applications.

Bushfire ratings

If construction is within a bushfire prone area, then several additional design and performance parameters will apply.¹⁰ The relevant standard is *AS3959-2018 Construction of buildings in bushfire-prone areas*, which provides the methodology for determining the Bushfire Attack Level (BAL) for a site and the construction requirements for each building element for each BAL classification.¹¹ It is critical for designers and specifiers to confirm that the selected door system has been bushfire tested and meets the design requirements of the relevant BAL.

Ease of Maintenance

Door systems require regular maintenance to maintain quality and performance. Depending on the material, periodic cleaning is required to prevent issues such as environmental degradation and loss of slip resistance. Door sills with removable stainless steel or aluminium grate inserts allow for easy cleaning, which will extend the service life of the product.

ALSPEC

Alspec® equips architects, fabricators, builders and renovators with a comprehensive range of aluminium systems and products for commercial, residential, home improvement and industrial applications. An Australian-owned, forward looking company, we work in-house to design, develop and test reliable

aluminium systems, hardware and accessories to meet evolving market needs. With locations across Australia and more than 40 years of experience, our investments in research and our people enable us to continuously expand our product range while delivering the highest levels of service and support.

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DESIGNED FOR ACCESS: ALSPEC DOOR SYSTEMS

With their Hawkesbury Top Hung Sliding Door, Hawkesbury Multi-Fold, ProGlide UltraFlat and the Swan Evo 45mm Shopfront Door, Alspec offers a versatile range of door systems for almost any application, including healthcare and aged-care environments. Featuring AS1428.1-compliant sills and unrivaled build quality, Alspec door systems are designed for accessibility, functionality and performance.

All Alspec solutions are made from high quality materials and built to withstand harsh Australian weather conditions. Alspec door systems have been tested for thermal and acoustic performance, and bushfire tested to BAL40.

Key features include:

- AS1428.1-compliant, water and weather-resistant sills.
- Options for wide lockstiles for each system provides the opportunity to use appropriate door controls that comply with access standards and eliminate possible pinch points.
- Minimal maintenance requirements with options for removable stainless steel or aluminium grate inserts enables easy cleaning.
- All systems can accommodate flyscreens and single or double-glazed window units.

HAWKESBURY TOP HUNG SLIDING DOOR

The Hawkesbury Top Hung Sliding Door from Alspec offers design flexibility and freedom to achieve large expansive openings, while offering weather resistance and a wheelchair-compliant sill. This door system enables seamless transition between internal and external floor finishes and is capable of large panel sizes of up to 3000mm in height and 2500mm in width. Multi-stack configurations are available using high quality E3 hardware by Centor.

HAWKESBURY MULTI-FOLD DOOR

Designed for large floor to ceiling applications, the Hawkesbury Multi-Fold Door Range combines full-sized commercial perimeter framing with commercial door stiles. Smooth and easy-to-operate, the Hawkesbury Multi-Fold Door is a functional alternative to traditional door units in lighter commercial and residential applications enabling free access between indoor and outdoor spaces. Alspec Hawkesbury Doors can be left open in fine weather or securely fastened into place as sturdy barriers.

PROGLIDE ULTRAFLAT

ProGlide UltraFlat is a high performance wheelchair accessible sliding door that achieves large openings without compromising on performance or aesthetics. With a heavy duty aluminium profile, the ProGlide UltraFlat offers strength and durability and large sliding panels ideal for a wide range of environments. This system accepts up to 13.52mm single-glazed and up to 28mm double-glazing units, allowing the designer to meet demanding thermal and acoustic requirements.

SWAN EVO 45MM SHOPFRONT DOOR

The Swan Evo 45mm Shopfront Door is a versatile shopfront door that is easy to fabricate and install. Suitable for a wide range of applications, the Swan Evo can be used in hinged, pivoted or sliding configurations and integrates seamlessly with the Alspec commercial framing systems.

REFERENCES

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All information provided correct as of March 2020