

You need a stair for your project or property but you're not sure where to start? Not sure what regulations apply and how they interact?... read on....

You'll likely need engagement from your fire engineer and Architect but along with them Monkeytoe can provide a stair design service which complies with their requirements, structural requirements and the building code (link to custom design or other design links). The design then flows through manufacture and even installation if required.

This piece will help guide you on your choice of design specification. This guide outlines information in the acceptable solution D1/AS1, for clarification on details please consult this document and relevant AS/NZS standards and literature. All stairs are required to be designed to enable the safe exit of occupants in the event of a fire. To confirm the width, design category, landings, required length/distance and number of people it services requires the building to be assessed by a relevant professional.

### Design Category

The Design Category of stairs can be defined broadly into 4 categories:

1 'Accessible', 2 'Common' 3 'Service'/'Private' ('Minor Private' and 'Secondary Private') and 4 Restricted access stairs that are generally used for building maintenance operations such as roof access, these are covered by the AS1657-2017 standard. These classifications govern the pitch or angle, depth of steps and other design characteristics.

A 'Common' stair can be steeper and have open steps whereas an 'Accessible' stair must have a closed design and a wider tread. If the stairs are the only access in a publicly accessible building at least one set must be a 'accessible' stair and the second may be a common, service, or private stair depending on the site specifics. Accessible stairs are not required for private dwellings and small industrial buildings.

### Accessible Stairs

These are the easiest access stairs with the gentlest pitch, normally have handrails both sides and designed to be able to be used by wheelchairs if needed. These are typically for public facilities main access, and larger commercial building access stairs. Public access buildings and large premises need to have one accessible route and often a second stair can be classified as a common, service or private stair.

### Common Stairs

These are main stairs to housing and external stairs such as secondary fire escape stairs and those are accessible to the public but not required to provide for disabled access. Applications include entrance stairs to houses and apartments and externally mounted fire escape stairs.

### Service/ Private Stairs

These are secondary stairs to provide access for service personnel or private access to bedrooms or bathroom areas but not access to kitchens, living rooms garages, does not include external stairs access to verandas and those that are accessible by the public. These are defined in D1/AS1 as: Minor Private, Secondary Private and Service.

### Restricted Access Stairs

Areas that are closed by gates or doors or bars and have access restricted to normal occupants are covered by the standard AS1657-2017. These are often incorporated with service and maintenance walkways such as roof top and plant area access systems. These can be steeper and narrower than normal stairs used for everyday use. When specifying these stairs, it is often required to clarify the status of AS1657 as an acceptable solution for this application with the consenting authority.

### Design Limit Cheat Sheet

Table 1 is a quick reference showing the limits that stairs need to be designed to according to D1/AS1 and AS1657- 2018, for more information read the descriptions below and the standards themselves.

Stair Design Limits D1/AS1 and AS1657				
Design Feature	Accessible Stairs	Common Stairs	Service/Private <sup>1</sup> Stairs	Restricted Access (AS1657)
Max Height Per Flight	2.5m	2.5m	4m	4m
Max Height before change of Direction	8m	8m	8m	8m
Pitch Angle	23° - 32°	23° - 37°	23° - 47°	20° - 45°
Max Height of Flight	2.5 m	2.5 m	4 m	4 m
Max Step Height	180	190	220	225
Min Tread Depth	310	280	220	185
Riser Style	Closed	Closed, Open if accessible alternative stair available and has visibility strip*	Open <sup>1</sup>	Open
No of risers per flight	≤13	≤13	≤18	≥2 ≤18
Width between handrails	900 mm	900 mm	600, 850 mm	600 mm
Landings	900 mm	900 mm	900 mm	600 mm
andrails	Both sides	One side ≤2 m	One side ≤2 m	One side ≤ 1 m
Tread Projection	0-25 mm	0-25 mm – 15 min for Open	25 mm – 15 min for Open	≥-30 mm
For more information on <b>Secondary</b> Private stairs see D1/AS1, not covered here. For maintenance access systems covered by AS1657-2018 Required for multi unit dwellings and recommended for private, 600 mm is OK for service stairs				

### Stair Design Features

#### Stair Widths

Stairway width is always measured between handrails, the minimum width for Accessible and Common stairs is 900 mm. For Multi-unit residential stairs, the minimum is 850 mm, this is recommended but not mandatory for private stairs. For service stairs and for normally restricted area access systems for e.g., roof maintenance and building services access the minimum width is 600 mm this is covered by AS1657-2018 rather than D1/AS1. It must be noted that for larger buildings the width of stairs is also governed by the fire escape methodology developed by the fire engineer.

#### Handrail Requirements

Handrails should always be on both sides for all Accessible stairs, and Common and Private stairs greater than 2m wide. A central handrail is required for widths greater than 4m. For other stair types a single handrail is permitted for widths less than 2m. Handrails are not required for short steps of 2 or 3 risers for common or private residential applications. Handrails should be continuous except for door openings.

#### Handrails Location

They must be mounted 900mm – 1000 mm above the landing and stair nosing, it can transition to a height of 1100 mm when on top of a barrier on an intermediate landing.

Handrails must extend 300mm past the end of the steps for accessible stairs

The handrails must be 45-60 mm from the side of the wall or stair, 90 mm from the top of the handrail to the mounting bracket and a min of 100 mm beneath overhangs.

The handrails are not allowed to intrude into the working area of the stair and landing area except for central handrails including those on the inside of a change of direction landing.

#### Landings

Landings are the space required at the top and bottom of each flight for resting, access and changing direction. Landings are required on all stairs where the rise is greater than 600 mm. Where a door opens onto the landing a space of 400 mm is required to be free of the door edge while opening.

#### Change of Direction

A change of direction or a landing length of more than 1800 mm (2m for AS1657) is required when consecutive in line stairs rise greater than 8m.

#### Open Risers

Open risers are allowable on service and private stairs, when able to be accessed by children 6 years and under the maximum opening must be 100 mm. When there is an accessible alternative available common stair may have open risers. Accessible stairs must always have closed risers.

#### Tread Projection, Edge Nosing

Treads on Accessible and Common stairs which are required to have closed risers have a maximum tread projection of 25 mm. For Common and Service/Private which can have open risers' stairs must have a minimum projection of 15 mm and a maximum of 25 mm, if closed risers are used a minimum

of 0 mm is acceptable. All stairs require the leading edge to be visible, this is normally achieved with a visibly contrasting nosing cover which also provides extra grip.

### Fire Escape Stairs

Fire Escape Stairs are designed to provide a means of escape during a fire. They will be categorised as accessible, common or service depending on each application. Depending on the location and function of these they need to be structurally sound and keep the users safe during evacuation. Aluminium is a Lightweight Long-lasting material ideal for fire exit stairs. The design and placement of the stair needs to ensure any fire protection systems are independent of the stair to provide proper protection. This can be achieved by protective shielding, locating stairs in their own fire cell or locating them away from the side of buildings and window openings

### Other Requirements

Other requirements that need to be considered but not covered in this document are slip resistance, visibility, obstructions, fire engineering requirements and engineering loads. For more information on these please refer to the relevant standards and MBIE literature

### Terminology

**ACCESSIBLE STAIR/STAIRWAY** - A stairway having features for use by people with disabilities. Usually required in places that the public use, regardless of whether a lift is provided. Not required for private dwellings and small industrial buildings.

**COMMON STAIR/STAIRWAY** - A stairway which is used able to be accessed by the public but not required to have features for the disabled. Typically for private dwellings entrance, external stairs, and small industrial buildings. NOTE: a Main Private Stair has the same requirements as a Common Stair

**SERVICE STAIR/STAIRWAY** - A stairway that is used infrequently by service personnel to gain access to spaces for the service and maintenance of goods.

**PRIVATE STAIR/STAIRWAY**: A stair used by a household unit.

**FLIGHT**: The set of steps in between two landings

**RISER**: The vertical height of the step determined by measuring from the top of each surface

**PITCH**: The Angle of the stair obtained by measuring the angle from the front edge of each step

**OPEN RISER**: Stairs having no material on the vertical face between the treads

**TREAD DEPTH**: The measurement of the tread taken from the front to the back edge for open risers and from the front edge to the back corner for closed risers

**TREAD PROJECTION**: The amount each step overhangs the one below that