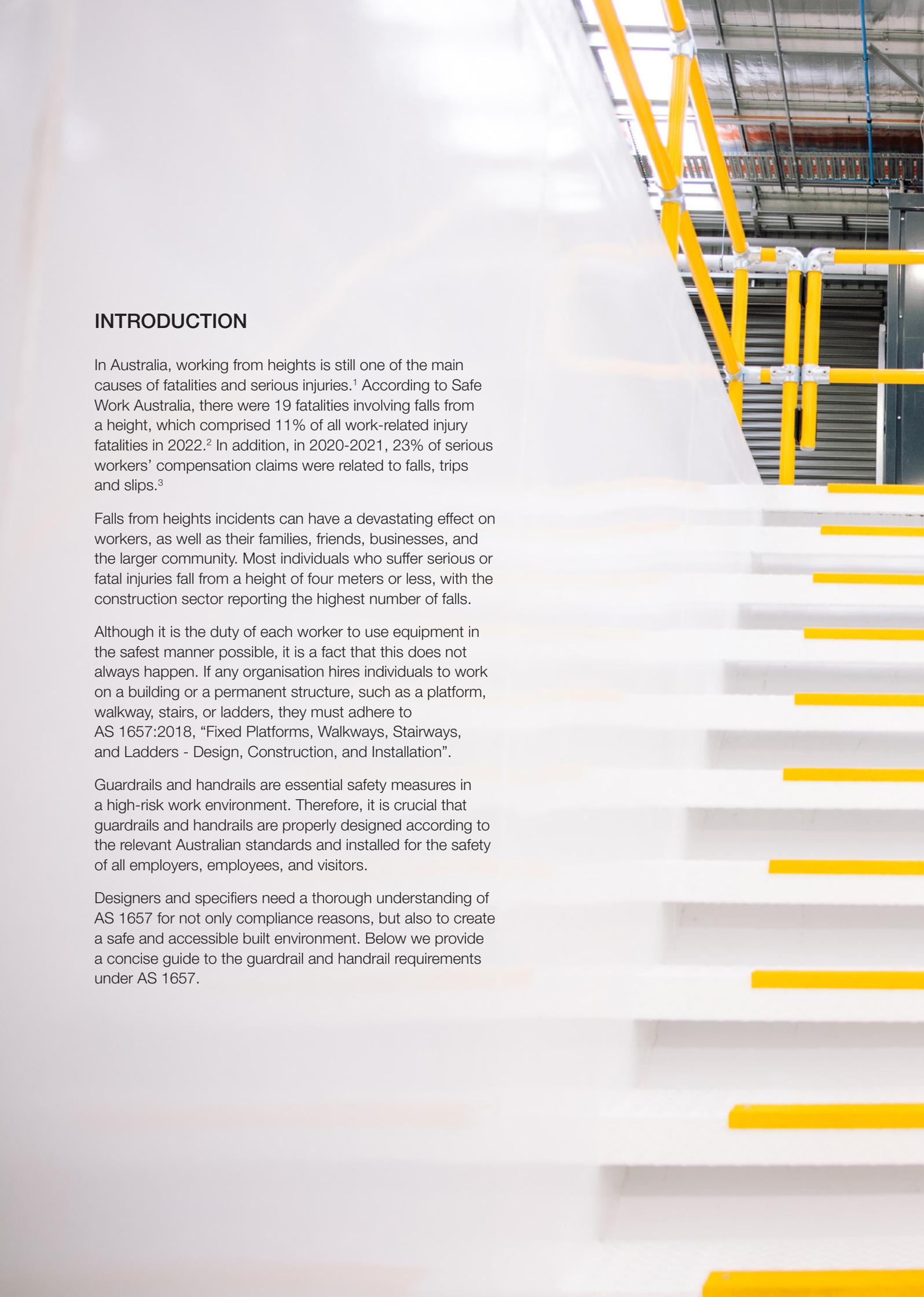




Height Safety Compliance

An Essential Guide to AS 1657
Guardrail and Handrail Design Requirements

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INTRODUCTION

In Australia, working from heights is still one of the main causes of fatalities and serious injuries.¹ According to Safe Work Australia, there were 19 fatalities involving falls from a height, which comprised 11% of all work-related injury fatalities in 2022.² In addition, in 2020-2021, 23% of serious workers' compensation claims were related to falls, trips and slips.³

Falls from heights incidents can have a devastating effect on workers, as well as their families, friends, businesses, and the larger community. Most individuals who suffer serious or fatal injuries fall from a height of four meters or less, with the construction sector reporting the highest number of falls.

Although it is the duty of each worker to use equipment in the safest manner possible, it is a fact that this does not always happen. If any organisation hires individuals to work on a building or a permanent structure, such as a platform, walkway, stairs, or ladders, they must adhere to AS 1657:2018, "Fixed Platforms, Walkways, Stairways, and Ladders - Design, Construction, and Installation".

Guardrails and handrails are essential safety measures in a high-risk work environment. Therefore, it is crucial that guardrails and handrails are properly designed according to the relevant Australian standards and installed for the safety of all employers, employees, and visitors.

Designers and specifiers need a thorough understanding of AS 1657 for not only compliance reasons, but also to create a safe and accessible built environment. Below we provide a concise guide to the guardrail and handrail requirements under AS 1657.





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SCOPE OF AS 1657

AS 1657 is one of Australia’s most frequently referred-to standards. It is referenced in the National Construction Code (NCC) and is one of the most widely referenced Australian standards for safe and accessible design in workplace health and safety legislation and building regulations.

In general, AS 1657 sets out requirements for the design, selection, construction and installation of fixed platforms, walkways, stairways and ladders that are intended to provide safe access to places used by operating, inspection, maintenance and servicing personnel. It

also applies to movable platforms that are permanently configured but that may be site adjustable, or site assembled/modified; and permanently installed roof access for various installation, operation or maintenance purposes in relation to equipment that is located on the roof, or the roof itself.

Note that AS 1657 does not apply in situations where special provisions are made in the appropriate building codes or other regulations, such as in relation to a fire escape route, or in publicly accessible areas like rooftop gardens, apartment balconies, or other similar areas.

UNDERSTANDING HANDRAILS AND GUARDRAILS

When it comes to safety planning, a fall restraint system is at the forefront of protecting workers from potential hazards. Guardrails and handrails are critical elements of this system.

Guardrails provide edge protection at the edge of a floor, platform or walkway. They are used to prevent employees from falling off a high structure or platform, such as a roof. Because of their vertical barrier design, they will remain in place if someone pushes or falls into them. In addition, guardrails serve as a visual cue and a warning that there may be dangers nearby, such as cliffs or the edge of roofs.

The key function of a handrail is to provide a handhold on a platform, walkway, stairway or step ladder. Handrails are different from guardrails in that they give people something to firmly hold on to as they move along a structure that is elevated above the ground, such as a roof, platform, or walkway. A handrail helps a worker maintain stability and balance, which lowers their risk of tripping or slipping, but they are not designed, on their own, to withstand the weight and force of a falling person. That said, it is possible to design a guardrail so that it can be used as a handrail.

AS 1657 HANDRAIL AND GUARDRAIL REQUIREMENTS

When are they needed?

According to AS 1657, if a pedestrian walkway, landing, or platform is elevated by more than 300mm, a handrail is necessary on the sides that are exposed.

On platforms and landings, guardrails are required when it is not safe to step or stand outside the walkway without risk of falling. This may be because the step-down is too large (i.e. more than 300mm), the slope of the adjacent area is too steep (i.e. more than 12°); the adjacent area is too narrow (i.e. less than 2000mm wide); or the surface is not suitable for walking.

Stairways and stairway landings shall be provided with guardrailing on any exposed side, except where there is a fixed structure within 100mm of the stairway stile. Each stairway must have at least one handrail and, if it is wider than 1000mm, a handrail on each side. Handrails shall also be provided on both sides of a step-type ladder.

General dimensions

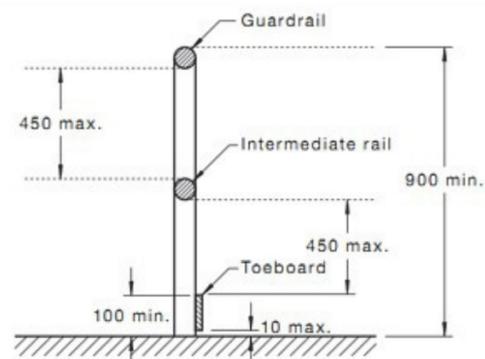
Handrail and guardrailing requirements have been created specifically to prevent height-related injuries, especially for platforms or mezzanines that are elevated from the ground where a fall could result in catastrophic injury or death. In general, they must have a top rail that is parallel to the floor or, if used on a sloping walkway, parallel to the slope of the walkway, and supported by posts spaced at intervals necessary to meet the specified imposed actions.

A handrail must extend between 900mm and 1100mm above the ground or the nosing of a stair tread. Where

there is a significant risk of falling from a height, it is advised to raise the guardrail's height to at least 1000mm.

If circular metal handrails are offered, their external diameter must range from 30mm to 65mm. When square or rectangular handrails are present, their combined height and width must range from 70mm to 100 mm. In addition, handrails must not have any sharp edges or other features that could injure the user, and they must allow the user's hand to move freely along the upper surface with a minimum hand clearance of 50mm.

Guardrailing must have a top rail and a knee rail that are both parallel to the ground, walkway, or platform. The knee rail must be at least 560mm from the ground. Where toeboards are used, there should be 450mm or less between the top of the toeboard and the knee rail.



DIMENSIONS IN MILLIMETRES

FIGURE 6.1 TYPICAL GUARDRAILING—KEY DIMENSIONS

When is a toeboard or kickplate required?

A toeboard must be installed if there is a gap that is more than 10mm wide from a permanent structure or if falling objects pose a risk to personnel entering the area below.

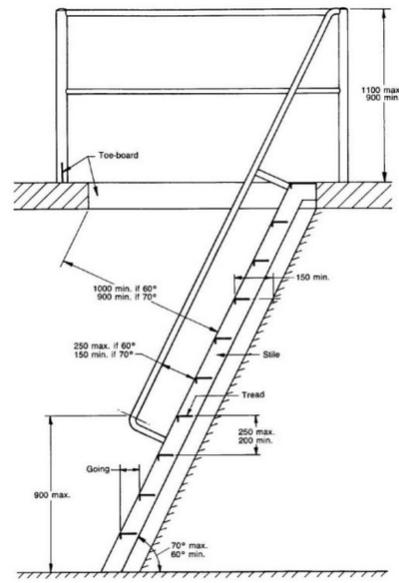
The underside of the toeboard and the walkway surface cannot have any gaps larger than 10mm. The top of the toeboard must be at least 100mm above the floor.

Handrail requirements on step-type ladders

A step ladder must have handrails on both sides, with 550mm to 750mm of clear space between each one. The bottom of the handrails must begin at a point that is no higher than 900mm above the landing. A step-type ladder's clear distance from the handrail to the plane of the nosing of the treads, measured perpendicular to the slope of the ladder, cannot be less than 150mm or greater than 200mm.

There are additional requirements to consider where the handrails of a step-type ladder join the handrails on a platform or walkway above. To allow continuous contact with the handrail while moving from the ladder to the platform/walkway and vice versa, the handrails of the step-type ladder and platform/walkway should be blended to form a smooth transition.

Alternatively, handrails should be positioned so that a user can move their hands continuously along the handrail surface until they reach the walkway or platform. Additionally, there must be a minimum 50 mm distance between the handrail surface and any nearby structures that might come into contact with the user's hand. Also, any gap measured between the ends or components of the handrails must not exceed 100 mm measured horizontally.



What about load ratings?

Guardrails must be built to withstand an individual acting force of 600 N or 350 N/m acting outwards or downwards at any point along the system. Under the applied load, no component of the system may deflect elastically by more than 100mm. The forces imposed by wind loading are another load to take into account when designing the system.

Any part of the toeboard must be capable of withstanding a horizontal force of 100 N, with no elastic deflection exceeding 30 mm and no gap exceeding 10 mm between the inside face of the toeboard and the edge.

Note that the relevant load testing requirements are detailed in AS 1657.



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SPECIFY COMPLIANT INDUSTRIAL HANDRAILS WITH MODDEX

Moddex Tuffrail industrial handrail systems ensure workers, pedestrians, employees and site visitors are protected. This range boasts three material options – being suited for general warehouse use, through to use in extremely high corrosion areas.

Moddex industrial handrails deliver AS 1657:2018 and NZS 1657:1992 compliant protection for workers across mezzanines, stairs, service platforms, walkways and fall edges.

The innovative Tuffgard Toeboard is incorporated into this range for applications with open access beneath where an object could fall (see AS/NZS 1657 for more information).

With five configurations available in the Tuffrail family (with variations), Moddex industrial handrails offer:

- Single rail edge protection for “on ground” applications
- Top and mid rail designs incorporating Tuffgard® Toeboard
- Hot Dip Galvanized Steel, Aluminium – Mill Finish and 316 Grade Stainless Steel options
- Y14 Safety Yellow powder coat (Dulux Duralloy) finish product in stock
- Custom powder coating options (available on request)
- Compliant industrial handrails

Tuffrail can be combined with other Moddex solutions, such as the Assistrail system, to create a smooth transition to allow continuous contact with the handrail from a platform/walkway to a step-type ladder, and vice versa.



About Moddex

Moddex are Australasia's leading manufacturer of modular, no-weld, hot dip galvanized barrier systems. Pre-engineered for structural integrity, their proprietary systems are load tested and configured to Australian and New Zealand Standards (AS/NZS), Workplace Health and Safety guidelines (WHS/OSH), Australia's National Construction Code (NCC/BCA) and the New Zealand Building Code (NZBC).

To help you with design and installation, our team of Moddex technical experts are on hand with recommendations and compliance advice.

- 1 Safe Work Australia. "Key work health and safety statistics Australia 2022." SWA. <https://www.safeworkaustralia.gov.au/doc/key-work-health-and-safety-statistics-australia-2022> (accessed 11 September 2023).
- 2 Ibid.
- 3 Ibid.

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All information provided correct as of October 2023

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