

AS/NZS 4994.1:2023



Australian/New Zealand Standard™

Temporary edge protection

Part 1: General requirements



AS/NZS 4994.1:2023

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- Australian Roofing Tile Association
- Better Regulation Division (Fair Trading, Safework NSW, Testsafe)
- Edge Protection New Zealand
- Hire and Rental Industry Association of Australia
- Housing Industry Association
- Master Builders Australia
- Master Plumbers Australia and New Zealand
- National Edge Protection and Platform Association
- Site Safe New Zealand
- Victorian WorkCover Authority (WorkSafe Victoria)

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Australian/New Zealand Standard™

Temporary edge protection

Part 1: General requirements

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD-092, Temporary edge protection — Construction practices, to supersede AS/NZS 4994.1:2009.

The objective of this document is to specify requirements for the design, manufacture, installation, and testing of temporary edge protection equipment used on roofs having slopes not greater than 35° to the horizontal and for other exposed edges, prior to the installation of the permanent walling materials.

This Standard is part of a series, which includes the following:

- (a) AS/NZS 4994.2, specifying requirements for the installation and dismantling of roof edge protection.
- (b) AS/NZS 4994.3, specifying requirements for the installation and dismantling of edge protection of other edges prior to the installation of the permanent edge protection.
- (c) AS/NZS 4994.4, specifying requirements for the design, manufacture, installation, re-positioning and dismantling of perimeter protection screens.

The major changes between this edition and the 2009 edition are as follows:

- (i) Scope was revised to include AS/NZS 4994.4.
- (ii) Expanded the configuration clauses to consider material conveyers.
- (iii) Testing appendix was updated to ensure clarity.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a document, whereas an “informative” appendix is only for information and guidance.

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Temporary edge protection

Part 1: General requirements

Section 1 Scope and general

1.1 Scope

This document specifies requirements for the design, manufacture, installation and testing of temporary edge protection equipment used on roofs having slopes not greater than 35° to the horizontal and for other exposed edges, prior to the installation of the permanent walling materials.

Temporary edge protection is used on buildings that are being constructed, renovated, extended, altered or maintained.

The requirements of this document apply to scaffolding required to act as temporary edge protection.

This document does not apply to the containment of materials on roofs.

NOTE 1 Where roof slopes exceed 35°, roof edge protection should be specifically designed. In some instances, another form of restraint may be required to avoid risk of excessive impact.

NOTE 2 Specific statutory requirements may apply regarding work health and safety legislation, scaffolding and working at heights.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1163, *Structural steel hollow sections*

AS 1720.1, *Timber structures, Part 1: Design methods*

AS 1874, *Aluminium and aluminium alloys—Ingots and castings*

AS 1892 (series), *Portable ladders*

AS 4100, *Steel structures*

AS 4750, *Electrogalvanized (zinc) coatings on ferrous hollow and open sections*

AS/NZS 1170.2, *Structural design actions, Part 2: Wind actions*

AS/NZS 1576.1, *Scaffolding, Part 1: General requirements*

AS/NZS 1576.2, *Scaffolding, Part 2: Couplers and accessories*

AS/NZS 1576.3, *Scaffolding, Part 3: Prefabricated and tube-and-coupler scaffolding*

AS/NZS 1576.6, *Scaffolding, Part 6: Metal tube-and-coupler scaffolding — Deemed to conform to AS/NZS 1576.1*

AS/NZS 1577, *Scaffold decking components*

AS/NZS 1594, *Hot-rolled steel flat products*

AS/NZS 1664.1, *Aluminium structures, Part 1: Limit state design*

AS/NZS 1664.2, *Aluminium structures, Part 2: Allowable stress design*

AS/NZS 1734, *Aluminium and aluminium alloys—Flat sheet, coiled sheet and plate*

AS/NZS 1866, *Aluminium and aluminium alloys—Extruded rod, bar, solid and hollow shapes*

AS/NZS 3678, *Structural steel—Hot-rolled plates, floorplates and slabs*

AS/NZS 3679.1, *Structural steel, Part 1: Hot-rolled bars and sections*

AS/NZS 4600, *Cold-formed steel structures*

AS/NZS 4680, *Hot-dip galvanized (zinc) coatings on fabricated ferrous articles*

AS/NZS 4792, *Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process*

1.3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

NOTE Where scaffolding components are used for edge protection, the definitions stated in the relevant scaffolding standards, as listed in [Clause 1.2](#), apply.

1.3.1

bottom rail

lowest rail in a guardrail system that does not include a toeboard or infill panel

1.3.2

guardrail system

structural edge protection system, which may comprise posts, rails, infill panels or toeboards, or combination thereof, that is designed to provide edge protection

Note 1 to entry: See [Clause 3.4](#) for further possible configurations.

Note 2 to entry: A guardrail system may be installed to protect the roof edge or the platform or slab edge.

1.3.3

gutter line

outside edge of the gutter or, where there is no gutter, the outside edge of the fascia, the outer ends of the rafters or top chords of the trusses

1.3.4

kickplate

plate (usually of metal) incorporated at the bottom of an infill panel

1.3.5

may

indicates the existence of an option

1.3.6

midrail

any rail fitted between the top rail and the bottom rail or toeboard

1.3.7

non-structural infill panel

panel, typically fabricated from steel wire mesh or other material, that requires backing rails to transfer design loads to supporting posts

Note 1 to entry: See [Figure 4.2](#) for infill panel types.

1.3.8**post**

structural member, including a scaffolding standard, that supports rails or infill panels and connects them to the building or other supporting structure

1.3.9**roof cladding**

outer weatherproof surface of the building that is supported by the roof structure

1.3.10**roof edge protection**

barrier system that is anchored to wall structures, roof structures or roof cladding, supported off the ground or at a level below the roof, or any combination of these, to prevent a person on a building from falling off the roof edge

1.3.11**roof surface**

effective walking surface

1.3.12**structural infill panel**

panel, typically fabricated from steel wire mesh, that does not require backing rails to transfer design loads to supporting posts

Note 1 to entry: See [Figure 4.2](#) for infill panel types.

1.3.13**shall**

indicates that a statement is mandatory

1.3.14**should**

indicates a recommendation

1.3.15**structural failure**

<during testing> actions such as weld failure, fracture of component material, fracture of a frame member, fracture of a supporting structure, or any combination of these

1.3.16**toeboard**

scaffold plank fixed on edge or a purpose-designed component that is fixed at the roof edge or platform to prevent a person from falling from the roof edge or platform

1.3.17**top rail**

highest rail of a roof guardrail system

1.4 New designs and innovations

This document does not prevent the use of design, materials, methods of assembly, procedures and the like that do not conform to the specific requirements of this document, or are not mentioned in it, provided the minimum dimensional and performance requirements specified herein are met.

1.5 Types of edge protection

Common types of edge protection include:

- (a) *Independent scaffolds* — Scaffolds using scaffolding equipment that conforms to [Clause 2.3](#) and AS/NZS 4994.2 and are placed adjacent to an edge that requires protection. Independent scaffolds may be used to protect roof edges or other edges.
- (b) *Prefabricated edge protection equipment* that are —
 - (i) connected to and supported by the wall or roof structure of a building where the roof edge requires protection. Top plate-hung scaffolds are included in this category.
 - (ii) connected to a slab, to building frame members, or to a combination of these in order to provide protection to edges that are not roof edge.
 - (iii) connected to temporary structures such as concrete blocks, temporary sheet piles embedded in the ground, shoring and formwork systems on a construction site, etc.

1.6 Product information

Documented information, in plain English and SI units, shall be provided about the edge protection system or edge protection equipment.

The information shall identify the supplier and the means of product identification.

At a minimum, the information shall include the following:

- (a) Instructions for installation, dismantling, use, transportation and storage.
- (b) A list of all components, with descriptions from which each can be identified.
- (c) Instructions for the servicing and inspection of the equipment and the rejection of damaged components.
- (d) Frequency of reinspection of installed systems.
- (e) Edge protection system limitation, including —
 - (i) maximum roof slope;
 - (ii) maximum rafter length;
 - (iii) the structural integrity of the roof cladding material;
 - (iv) whether or not the system has been designed and tested for dynamic loadings; and
 - (v) any other relevant limitations.
- (f) Acceptable configurations, including —
 - (i) maximum span between posts;
 - (ii) maximum extension past a post;
 - (iii) acceptable corner configurations (whether rails may be fixed solely to return rails at corners); and
 - (iv) any other relevant requirements.
- (g) Requirements for supporting components, including —
 - (i) minimum dimensions and grade of supporting components;

- (ii) maximum spacing and span of supporting components; and
 - (iii) any other relevant requirements.
- (h) A guide to working practices — Where scaffolding equipment is used to provide edge protection and, especially, where there is a possibility of dynamic forces impacting on the edge protection, particular guidance shall be provided to ensure the stability of the scaffolding equipment.
- (i) The materials, size range and minimum strength of members that will support the edge protection equipment. For roof edge protection, this includes rafters, truss chords and studs that are suitable for connection of the roof edge protection.

Section 2 Materials and components

2.1 Materials

Where the following materials are used, they shall conform to the following requirements:

- (a) Cast aluminium components shall conform to AS 1874 and have —
 - (i) an ultimate strength of not less than 160 MPa; and
 - (ii) an elongation of not less than 3 %.

Where pressure die-casting is used as a method of manufacture, the casting technique shall enable conformance to these properties.
- (b) Wrought aluminium alloy components designated in accordance with AS/NZS 1664.1, AS/NZS 1664.2 and conforming to AS/NZS 1866 for extrusions, or AS/NZS 1734 for sheet and plate.
- (c) Steel tube and structural steel components conforming to AS 1163, AS/NZS 1594, AS/NZS 3678 or AS/NZS 3679.1.

2.2 Surface finish of steel products

2.2.1 General

Fittings and components should be resistant to corrosion. With respect to galvanic action, the materials should be compatible. Paints, galvanizing or similar treatments may be used, provided resistance to corrosion is maintained.

Open-ended hollow steel sections shall be resistant to corrosion, both internally and externally.

2.2.2 Fabricated components

Where the wall thickness is less than 2.5 mm and the section has been subject to fabrication that includes welding, the component shall be hot-dip galvanized to ensure that both internal and external surfaces are coated in accordance with AS/NZS 4680.

2.2.3 Straight components

Where the wall thickness is less than 2.5 mm and where the only work has been cutting to length and drilling, components shall be —

- (a) electrogalvanized, internally and externally, in accordance with the requirements of AS 4750 for hollow sections of not less than coating class ZE100/100;
- (b) hot-dip galvanized, internally, in accordance with the requirements of AS/NZS 4792 for hollow sections of not less than coating class HDG200; or
- (c) welded hollow sections produced from a pre-galvanized strip of not less than coating class ZB100/100, in accordance with AS/NZS 4792.

2.3 Scaffolding equipment

Where scaffolding equipment is used as roof edge protection, it shall conform to AS/NZS 1576.1, AS/NZS 1576.2, AS/NZS 1576.3, AS/NZS 1576.6 or AS/NZS 1577, as relevant.

2.4 Chains and rope

Any flexible material, such as chain, rope (of any material), steel wire strand or reinforced fabric (such as tensioned webbing straps), shall not be used as roof edge protection.

NOTE Such material may be used to retain pins and other components when not in use.

Section 3 Design

3.1 General

Temporary edge protection shall be designed to contain or prevent any person from falling from the roof edge, the platform edge or other edges to which the temporary protection is attached.

3.2 Roof edge protection

Roof edge protection may take the form of either —

- (a) attachments to the building structure; or
- (b) a platform at the roof edge.

Where a platform is used, the platform shall contain or restrain any person sliding down or falling onto the platform.

Roof edge protection shall be able to withstand the greatest likely impact of a person falling against it.

NOTE Where a person falls or slips on the roof and impacts against temporary roof edge protection, the equipment and those parts of the building structure to which components of the roof edge protection are attached, may be dislodged or permanently damaged, consequently requiring repair or replacement.

3.3 Other edges protection

Edge protection, in general, may take the form of components attached to the floor structure or of components spanning between adjoining floors, where such components support the guardrailing.

NOTE For examples of temporary edge protection, see [Appendix G](#).

3.4 Principles of design

3.4.1 General

The design of edge protection shall take into account the following:

- (a) The strength and stability of the structure supporting or stabilizing the edge protection.
- (b) The behaviour of the edge protection and the supporting structure, at the points to which the edge protection system is attached, when subjected to an impact force.
- (c) Handling that may be associated with the erection and dismantling of the edge protection.
- (d) The safety of persons erecting and dismantling the edge protection system.
- (e) The safety of persons being protected by the roof edge protection.
- (f) Provision for the attachment of a toeboard or bottom rail.
- (g) The corrosion resistance and durability of the materials used in constructing the roof edge protection.

3.4.2 Design of roof edge protection

The design of roof edge protection shall take into account the following:

- (a) The slope of the roof.

NOTE This document covers roof slopes of up to 35° to the horizontal.

- (b) The length of the roof in the direction of its slope.
- (c) The type of roof cladding and its frictional resistance to a person sliding down the roof.
- (d) Access that may be required to the lower portion of the roof, for the installation of cladding.
- (e) Reinstatement of the roof cladding following removal of the roof edge protection.
- (f) The safety of persons passing through the roof edge protection to gain access to the roof.

3.4.3 Design of general edge protection

The design of general edge protection shall take into account the following:

- (a) Access for construction materials to pass the edge protection system. Where a material conveyor is used, the following shall apply:
 - (i) It shall not be supported by any part of the roof edge protection system.
 - (ii) Openings in the edge protection system shall be as small as practical to enable passage of the material conveyor.
 - (iii) When not in use, the edge protection system shall be reinstated.
 - (iv) The material conveyor shall be separate from, and not interfere with, personnel access.
- (b) Construction work immediately adjacent to, or conducted prior to dismantling of the edge protection system.

3.5 Basis of design

3.5.1 General

Edge protection shall incorporate some structural flexibility, in order to minimize any injury to any person/s who may impact on it. Sharp edges shall not be used.

3.5.2 Design requirements for edge protection

The edge protection shall be designed so that the forces transferred to the equipment will not cause or enable the edge protection to become detached from the supporting structure, thereby enabling a person to fall from the roof edge, platform or other edge.

Edge protection shall be designed by either —

- (a) structural analysis or
- (b) empirically, using testing to verify conformance to this document.

3.5.3 Material fatigue

The possible effects of material fatigue resulting from cyclic loading on connection points of the roof edge protection shall be taken into account.

3.5.4 Prefabricated elements

The design of prefabricated structural members and components of roof edge protection shall conform to: AS/NZS 1170.2, AS/NZS 1576, AS/NZS 1664.1, AS 1720.1, AS 4100, AS/NZS 4600 and AS/NZS 4792, as relevant.