MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Acceptable Solutions and Verification Methods

For New Zealand Building Code Clause
F4 Safety from Falling

F4
BUILDING CODE

Status of Verification Methods and Acceptable Solutions

Verification Methods and Acceptable Solutions are prepared by the Ministry of Business, Innovation and Employment in accordance with section 22 of the Building Act 2004. Verification Methods and Acceptable Solutions are for use in establishing compliance with the New Zealand Building Code.

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Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the status of Verification Methods and Acceptable Solutions and explains alternative methods of achieving compliance.

Defined words (italicised in the text) and classified uses are explained in Clauses A1 and A2 of the Building Code and in the Definitions at the start of this document.

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Verification Methods and Acceptable Solutions are available from www.building.govt.nz

New Zealand Government

Document Status

The most recent version of this document (Amendment 2), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 1 January 2017 and supersedes all previous versions of this document.

The previous version of this document (Amendment 1) will cease to have effect on 30 May 2017.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any Verification Method or Acceptable Solution at any time. Up-to-date versions of Verification Methods and Acceptable Solutions are available from www.building.govt.nz

F4: Document History			
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Note: Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.			

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New Zealand Building Code Clause F4 Safety from Falling

The mandatory provisions for building work are contained in the New Zealand Building Code (NZBC), which comprises the First Schedule to the Building Regulations 1992. The relevant NZBC Clause for Safety from Falling is F4.

FIRST SCHEDULE–*continued*

Clause F4–SAFETY FROM FALLING

Provisions	Limits on application
OBJECTIVE **F4.1** The objective of this provision is to safeguard people from injury caused by falling.	
FUNCTIONAL REQUIREMENT **F4.2** *Buildings* shall be constructed to reduce the likelihood of accidental fall.	
PERFORMANCE **F4.3.1** Where people could fall 1 metre or more from an opening in the external envelope or floor of a *building*, or from a sudden change of level within or associated with a *building*, a barrier shall be provided.	Performance F4.3.1 shall not apply where such a barrier would be incompatible with the *intended use* of an area, or to temporary barriers on *construction* sites where the possible fall is less than 3 metres or to *buildings* providing pedestrian access in remote locations where the route served presents similar natural hazards.
F4.3.2 Roofs with permanent access shall have barriers provided.	
F4.3.4 Barriers shall: (a) Be continuous and extend for the full extent of the hazard, (b) Be of appropriate height, (c) Be constructed with *adequate* rigidity, (d) Be of *adequate* strength to withstand the foreseeable impact of people and, where appropriate, the static pressure of people pressing against them. (e) Be constructed to prevent people from falling through them, and	

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FIRST SCHEDULE–*continued*

Provisions	
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(g) Restrict the passage of children under 6 years of age when provided to guard a change of level in areas likely to be frequented by them.	
Amend 1 Jun 2007 (h) Be constructed so that they are not readily able to be used as seats.	**Performance F4.3.4(h) does not apply to** *Housing*.
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References

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For the purposes of New Zealand Building Code compliance, the acceptable New Zealand and other Standards, and other documents referred to in these Acceptable Solutions and Verification Methods (primary reference documents) shall be the editions, along with their specific amendments, listed below. Where the primary reference documents refer to other Standards or other documents (secondary reference documents), which in turn may also refer to other Standards or other documents, and so on (lower order reference documents), then the applicable version of these secondary and lower order reference documents shall be the version in effect at the date these Acceptable Solutions and Verification Methods were published.

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Where quoted

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Definitions

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This is an abbreviated list of definitions for words or terms particularly relevant to in these Acceptable Solutions and Verification Methods. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

Balustrade The infill parts of a barrier (typically between floor and top rail).

Building has the meaning ascribed to it by sections 8 and 9 of the Building Act 2004.

Construct in relation to a *building*, includes to build, erect, prefabricate, and relocate; and **construction** has a corresponding meaning.

Handrail A rail to provide support to, or assist with the movement of, a person.

Household unit

a) means any *building* or group of *buildings*, or part of a *building* or group of *buildings*, that is:

   i) used, or intended to be used, only or mainly for residential purposes; and

   ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than one household; but

b) does not include a hostel, boarding house or other specialised accommodation.

Intended use in relation to a *building*:

a) includes any or all of the following:

   i) Any reasonably foreseeable occasional other use that is not incompatible with the *intended use*; and

   ii) Normal maintenance; and

   iii) Activities taken in response to *fire* or any other reasonably foreseeable emergency

b) but does not include any other maintenance and repairs or rebuilding.

Nosing The rounded projecting edge of a stair tread.

Pitch line The line joining the leading edge or *nosings* (if any) of successive stair treads within a single flight of stairs.

Theatre A place of assembly intended for the production and viewing of performing arts, and consisting of an auditorium and stage with provision for raising and suspending stage scenery above and clear of the working area.

Verification Method F4/VM1

No specific test methods have been adopted for verifying compliance with the Performance of NZBC F4.

Acceptable Solution F4/AS1

1.0 Barriers in Buildings

1.1 Barrier heights

1.1.1 Minimum barrier heights are given in Table 1.

COMMENT:
Refer to NZBC Clause D1 for *handrails* on stairs. *Handrails* can be constructed as an integral part of a barrier.

1.2 Barrier construction

1.2.1 In housing and other areas likely to be frequented by children under 6 years of age:

a) Figures 1-4 show acceptable barrier constructions

b) Openings anywhere over the full height of the barrier shall be such a size that a 100 mm diameter sphere cannot pass through them, and

c) The triangular opening formed by the riser, tread, and bottom rail of the barrier on a stair shall be of such a size that a 150 mm diameter sphere cannot pass through it (see Figure 4).

COMMENT:

1. *Buildings* classified as housing are always likely to be frequented by children under 6 years of age. However, 'Likely to be frequented' in regard to other *buildings* means something more than that children under 6 will be present from time to time. There should be an expectation that small children will be present on a regular basis (see Determination No. 2001/9 on www.dbh.govt.nz). Different parts of a *building* may have different barrier requirements, such as shopping malls where children under 6 are likely to frequent the public areas, but not the areas used for food preparation or the handling of stock.
2. The Clause F4.3.4(g) requirement that barriers restrict the passage of children under 6 years of age does not mean that all children under 6 must be unable to climb them. The Acceptable Solutions given here will prevent almost all children up to the age of 3 years from climbing. They can also be used as a guide for alternative designs.
3. Barriers with full height vertical members are the hardest for children to climb. Horizontal or near horizontal rails can easily be climbed by 2 year olds if the rails extend the full height of a barrier, even if the barrier includes a 200 mm wide top rail or if it slopes inwards at 15°.

Table 1: Minimum Barrier Heights
Paragraph 1.1.1, Figures 1-5

Building type	Location	Barrier height (mm) (Note 1)
Detached dwellings and within *household units* of multi-unit dwellings	Stairs and ramps and their intermediate landings	900
	Balconies and decks, and edges of internal floors or mezzanine floors	1000
All other *buildings*, and common areas of multi-unit dwellings	Stairs or ramps	900
	Barriers within 530 mm of the front of fixed seating	800
	All other locations	1100

Note:

1. Heights are measured vertically from finished floor level (ignoring carpet or vinyl, or similar thickness coverings) on floors, landings and ramps. On stairs the height is measured vertically from the *pitch line* or stair *nosings*.
2. A landing is a platform with the sole function of providing access.
3. Clause F4.3.1 has a limit on its application that may exclude the need for barriers in certain locations such as working wharves and loading docks.
4. An 800 mm high barrier in front of fixed seating would be appropriate in cinemas, *theatres*, and stadiums.
5. Where a *handrail* is mounted on top of a stairway barrier it may transition up to a height of 1100 mm on the intermediate landings.

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Figure 1: **Barriers in areas likely to be frequented by children under 6 years of age – mesh and composite**
Paragraph 1.2.1 a)

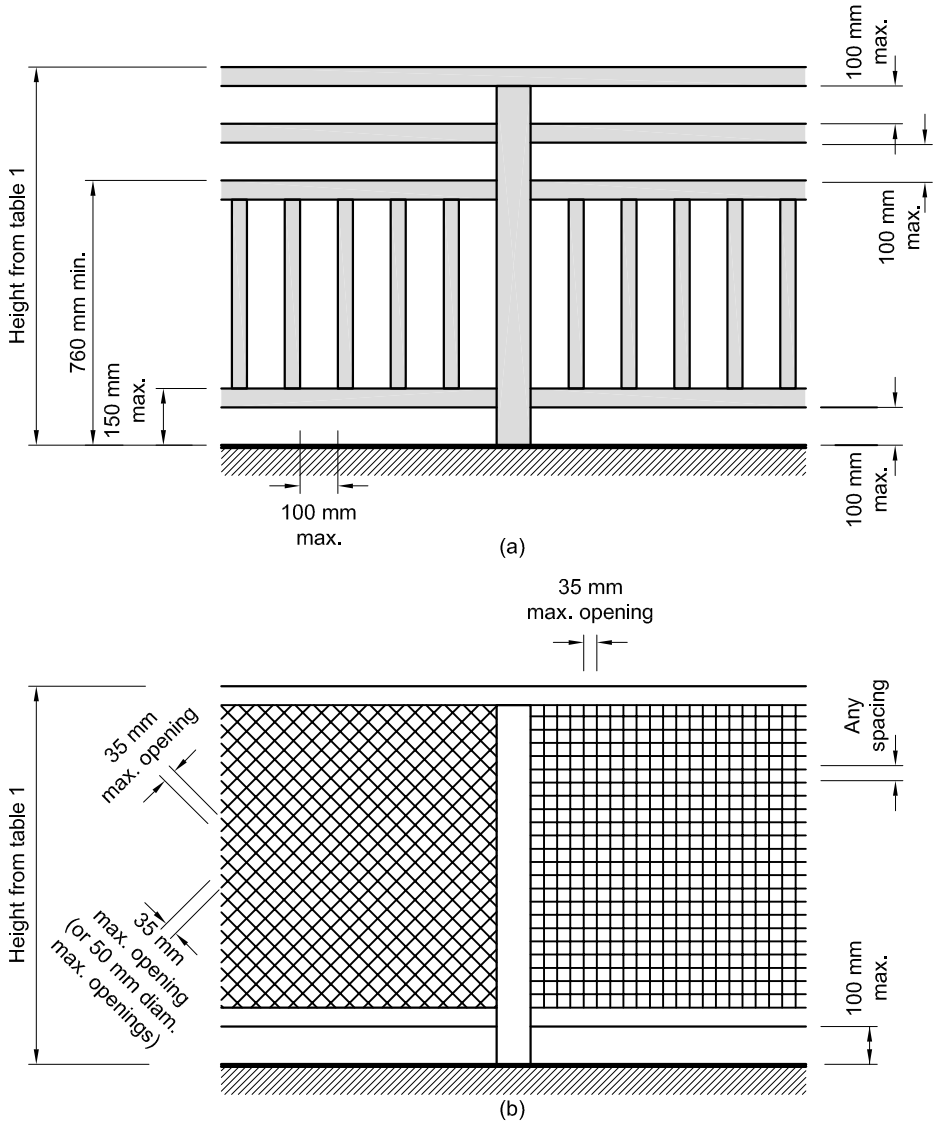


Figure 2: **Barriers in areas likely to be frequented by children under 6 years of age – parallel members**
Paragraph 1.2.1 a)

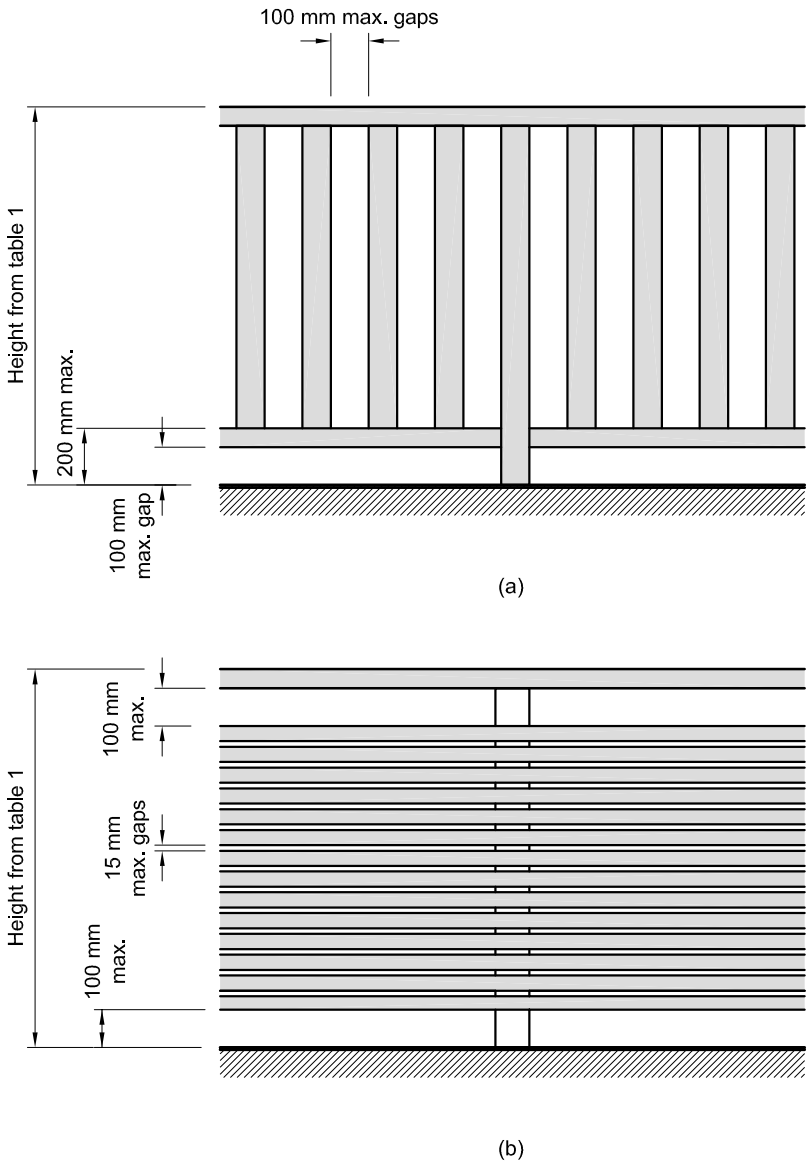


Figure 3: **Barriers in areas likely to be frequented by children under 6 years of age – glass or other solid material**
Paragraph 1.2.1 a)

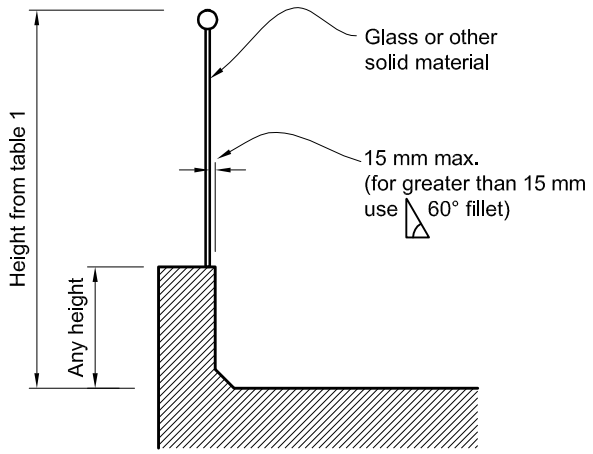
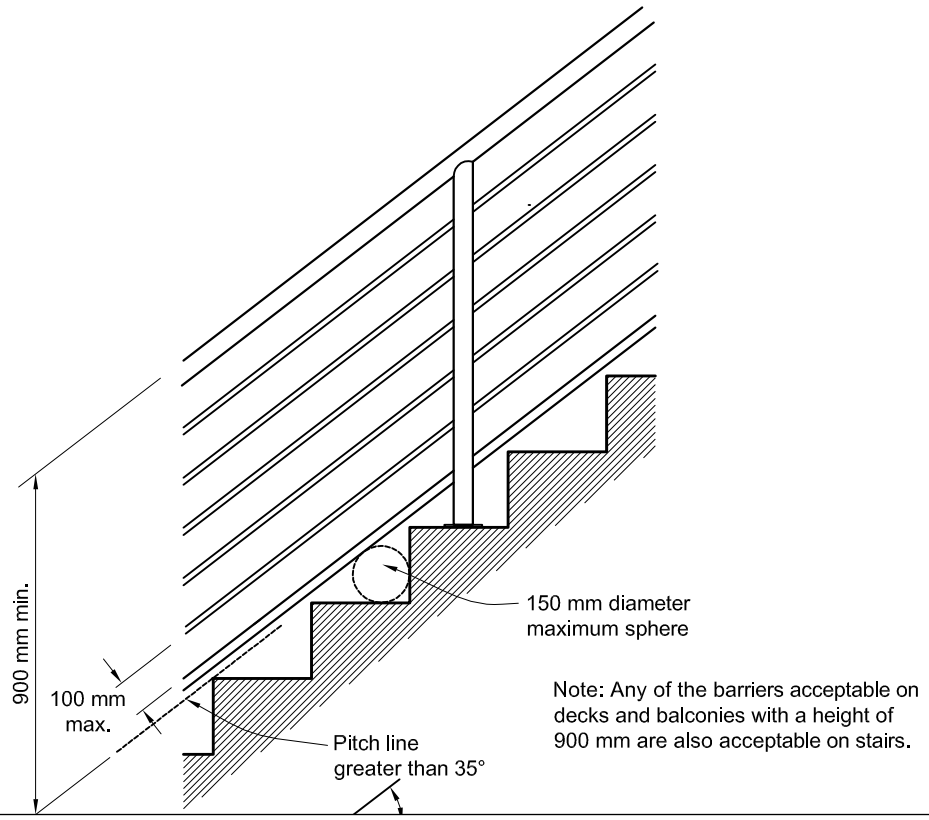


Figure 4: **Stair barrier in an area likely to be frequented by children under 6 years of age**
Paragraph 1.2.1 a)



1.2.2 In areas used exclusively for emergency or maintenance purposes in *buildings*, and in other *buildings* not frequented by children, barriers may have openings with maximum dimensions of either:

a) 300 mm horizontally between vertical *balustrade* members, or

b) 460 mm vertically between longitudinal rails.

COMMENT:
Where permanent access to roofs is provided only for the maintenance of building services the need for a barrier and its construction will depend on the roof slope and the proximity of the roof edge.

1.2.3 Figure 5 shows acceptable methods for constructing parapet and rail barriers so that they are not readily able to be used as seats, as required by Clause F4.3.4(h) for buildings other than housing.

COMMENT:
This requirement is particularly applicable to crowd situations such as cinemas, stadiums and bars.

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1.2.4 Where the height of fall from the deck on a house is less than 1 m, a fixed seat may be constructed on the deck as shown in Figure 6(a). Where the height of fall from the deck is more than 1 m, a fixed seat shall be constructed as in Figure 6(b).

1.2.5 When a barrier is provided on a retaining wall, it shall comply with Paragraphs 1.1 and 1.2.

COMMENT:
NZBC Clause F4.2 refers to the 'likelihood' of accidental fall. Not all retaining walls are in a location where people are likely to fall from them. Therefore, the need for a barrier (and the type of barrier) on a particular retaining wall can be judged in terms of the likelihood of people being present at the top of that wall (see Determination No. 99/012 on www.dbh.govt.nz)

1.2.6 Construction site barriers shall have:

a) one or more intermediate horizontal rails in addition to the top rail and a maximum vertical opening between rails of 460 mm, or

b) a top rail at a height of 1000 mm and a toeboard that extends at least 225 mm above the platform, and

c) barrier rails at a maximum distance of 200 mm horizontally from the platform edge.

Figure 5: Parapet and rail barriers
Paragraph 1.2.3

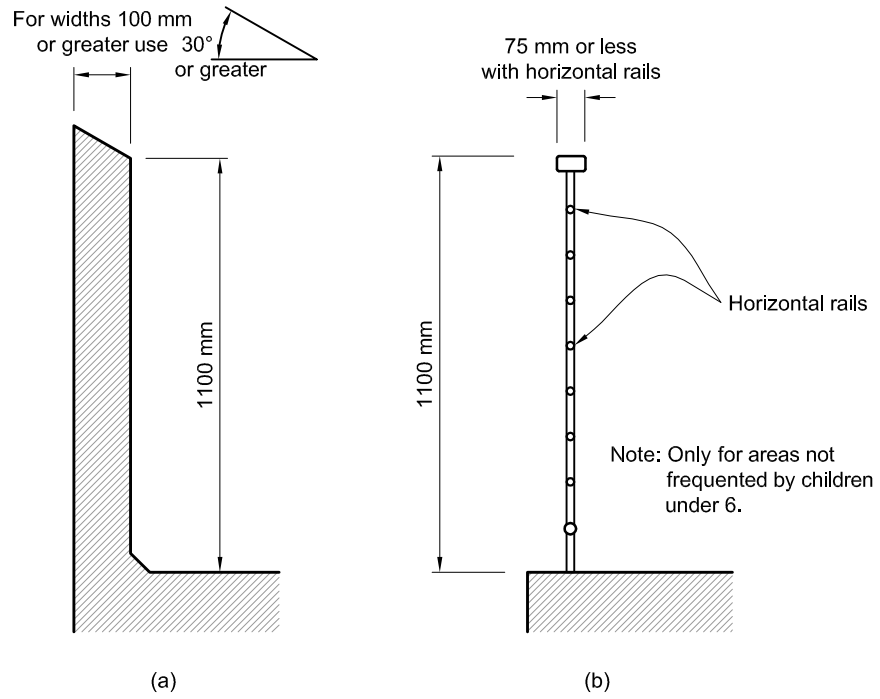

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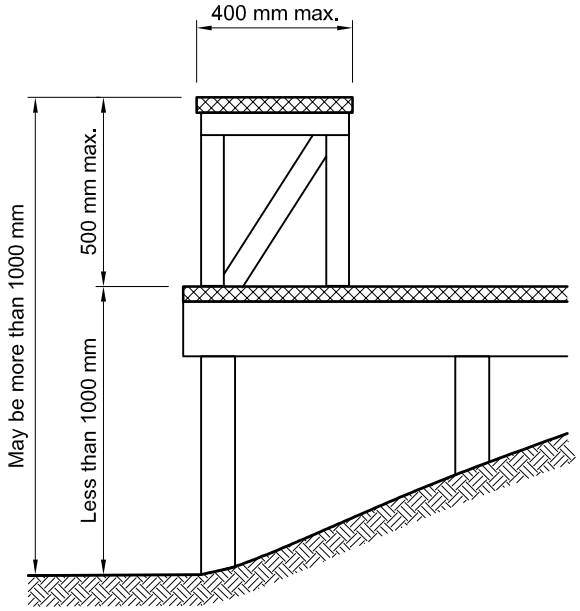
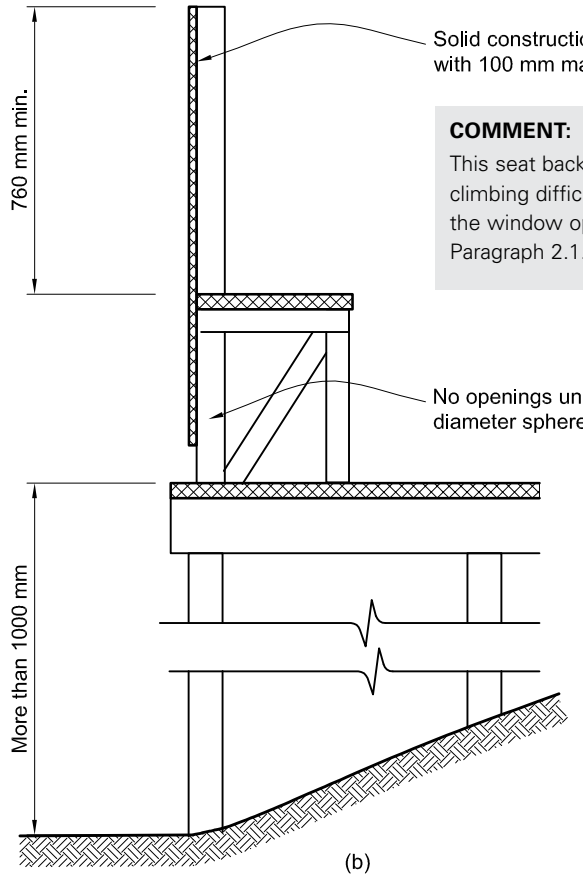
Figure 6: **Fixed seat on a deck to housing**
Paragraph 1.2.4



(a)



COMMENT:
This seat back height presents the same climbing difficulty for a small child as the window opening requirement of Paragraph 2.1.

(b)

Scaffolding cross-bracing between standards with a single lift may be used as a top rail for construction site barriers provided:

a) The braces cross at a height of between 1000 mm and 1100 mm above the platform, and

b) The platform is decked to within 200 mm of a vertical plane through the cross-bracing.

COMMENT:
See Worksafe guidance for working at any height.

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2.0 Opening windows

2.1 Paragraphs 2.1.1 to 2.1.4 apply where the possible height of fall from an open window is more than 1000 mm. The possible height of fall shall be measured from the inside floor level adjacent to the window.

Paragraphs 2.1.1(a) and 2.1.2(a) apply only when there are no projections or ledges below the opening that would assist a child in climbing.

COMMENT:
The height of the lower edge of the window opening above the floor usually determines the safety of the window for small children. However, the presence of a window seat or toilet pan means children can more easily gain access to the window opening.

If a fixed window seat is provided, the lower edge of the opening shall be measured from the seat.

Where a toilet pan or any other fixed feature is within 500 mm horizontally of a window, the lower edge of the opening shall be measured vertically from the pan or feature.

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2.1.1 In housing and areas of other *buildings* likely to be frequented by children under 6 years of age, a window with an opening width of less than 1000 mm shall have either:

a) the lower edge of the opening at least 760 mm above floor level, or

b) a restrictor fitted to limit the maximum opening so that a 100 mm diameter sphere cannot pass through it, or

c) a 760 mm high barrier protecting the opening of solid construction or with vertical members its full height.

COMMENT:

1. When a window opening width is less than 1000 mm a sill height of 760 mm is considered sufficient to protect older children and adults from falling through the opening. When the opening is wider than 1000 mm the opening needs to be treated in the same way if it were a balcony and the Table 1 barrier heights used, as in paragraph 2.1.2.

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2.1.2 In housing and areas of other *buildings* likely to be frequented by children under 6 years of age, a window with an opening width of more than 1000 mm shall have either:

a) the lower edge of the opening at a height above floor level as given for barriers in Table 1, or

b) a barrier of the same height protecting the opening complying with Paragraph 1.2.1.

2.1.3 In areas of *buildings* not likely to be frequented by children under 6 years of age, a window with an opening width of less than 1000 mm shall have either:

a) the lower edge of the opening at a height of at least 760 mm above floor level, or

b) a restrictor fitted to limit the maximum dimension of the opening in at least one direction to 460 mm, or

c) a 760 mm high barrier protecting the opening complying with Paragraph 1.2.2.

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2.1.4 In areas of *buildings* not likely to be frequented by children under 6 years of age, a window with an opening width of more than 1000 mm shall have either:

a) the lower edge of the opening at a height of at least 1100 mm above floor level, or

b) a 1100 mm high barrier protecting the opening complying with Paragraph 1.2.2, or

c) a restrictor fitted to limit the maximum dimension of the opening in at least one direction to 460 mm.

COMMENT:
Paragraphs 2.1.3 and 2.1.4 are not applicable to *housing,* see Table 1.

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All references to Verification Methods and Acceptable Solutions are preceded by **VM** or **AS** respectively.