Section 9.8. Stairs, Ramps, Handrails and Guards

9.8.1. Application

9.8.1.1. General

1) This Section applies to the design and construction of interior and exterior stairs, steps, ramps, handrails and *guards*.

9.8.1.2. Stairs, Ramps, Landings, Handrails and Guards in Garages

1) Where stairs, ramps, landings, handrails or *guards* are installed in garages that serve a single *dwelling unit*, the garage shall be considered to be part of the *dwelling unit* and the requirements for stairs, ramps, landings, handrails and *guards* within *dwelling units* shall apply.

9.8.1.3. Exit Stairs, Ramps and Landings

1) Where a stair, ramp or landing forms part of an *exit*, the appropriate requirements in Sections 9.9. and 9.10. shall also apply.

9.8.1.4. Escalators and Moving Walkways

1) Escalators and moving *walkways* shall conform to the appropriate requirements in Part 3.

9.8.2. Stair Dimensions

9.8.2.1. Stair Width

1) Except as provided in Sentence (2), required *exit* stairs and public stairs serving *buildings* of *residential occupancy* shall have a width of not less than 900 mm.

2) *Exit* stairs serving a single *dwelling unit* shall have a width of not less than 860 mm.

3) Required *exit* stairs and public stairs serving *buildings* of other than *residential occupancy* shall have a width of not less than the greater of

a) 900 mm, or

b) 8 mm per person based on the *occupant load* limits specified in Table 3.1.17.1.

4) At least one stair between each floor level within a *dwelling unit*, and exterior stairs serving a single *dwelling unit* except required *exit* stairs, shall have a width of not less than 860 mm.

9.8.2.2. Height over Stairs

1) The clear height over stairs shall be measured vertically, over the clear width of the stair, from a straight line tangent to the tread and landing nosings to the lowest point above. (See Note A-3.4.3.4.)

2) Except as provided in Sentence (3), the clear height over stairs shall not be less than 2 050 mm.

3) The clear height over stairs serving a single *dwelling unit* shall not be less than 1 950 mm.

9.8.3. Stair Configurations

9.8.3.1. Permitted Configurations

(See Note A-9.8.4.)

1) Except as provided by Sentence (2), stairs in *buildings* shall consist of

a) straight *flights*, or

b) except as provided in Sentence (4), curved *flights,*

2) Stairs within *dwelling units* shall consist of

a) straight *flights*,

b) except as provided in Sentence (4), curved *flights*,

c) **reserved**,

d) except as provided in Sentence (3), flights with rectangular treads and winders, or

e) **reserved**.

3) Only one set of winders described in Article 9.8.4.6. shall be permitted between floor levels.

4) Curved *flights* in *exits* shall comply with Sentence 3.4.6.9.(2).

5) All *tapered treads* within a *flight* shall turn in the same direction.

9.8.3.2. Minimum Number of Risers

1) Except for stairs within a *dwelling unit*, at least 3 risers shall be provided in interior *flights*.

9.8.3.3. Maximum Height of Stairs

1) The vertical height of any *flight* of stairs shall not exceed 3.7 m.

9.8.4. Step Dimensions

(See Note A-9.8.4.)

9.8.4.1. Dimensions for Risers

(See Note A-9.8.4.)

1) Except for stairs serving areas only used as *service rooms* or *service spaces*, the rise, which is measured as the vertical nosing-to-nosing distance, shall comply with Table 9.8.4.1.

Table 9.8.4.1.
Rise for Rectangular Treads and Tapered Treads (Including Winders)
Forming Part of Sentence 9.8.4.1.(1)

Stair Type	Rectangular Treads *and Tapered Treads* (Including Winders)	
	Rise, mm	
	Max.	Min.
Private[1]	200	125
Public[2]	180	125

Notes to Table 9.8.4.1.:

(1) Private stairs are exterior and interior stairs that serve single *dwelling units* or that serve garages that serve single *dwelling units*.

(2) Public stairs are all stairs not described as service stairs or private stairs.

9.8.4.2. Dimensions for Rectangular Treads

(See Note A-9.8.4.)

1) Except for stairs serving areas only used as *service rooms* or *service spaces*, the *run* shall comply with Table 9.8.4.2.

Table 9.8.4.2.
Run for Rectangular Treads
Forming Part of Sentence 9.8.4.2.(1)

Stair Type	Rectangular Treads	
	Run, mm	
	Max.	Min.
Private[1]	355	255
Public[2]	No limit	280

Notes to Table 9.8.4.2.:

(1) Private stairs are exterior and interior stairs that serve single *dwelling units* or that serve garages that serve single *dwelling units*.

(2) Public stairs are all stairs not described as service stairs or private stairs.

2) The depth of a rectangular tread shall be not less than its *run* and not more than its *run* plus 25 mm.

9.8.4.3. Dimensions of Tapered Treads

(See Note A-9.8.4.)

1) Except as provided in Sentence (3) and Article 9.8.4.6., *tapered treads* shall have a *run* that

a) is not less than 150 mm at the narrow end of the tread, and

b) complies with the dimensions stated in Table 9.8.4.2. when measured at a point 300 mm from the centre line of the handrail at the narrow end of the tread.

2) *Tapered treads* in required *exit* stairs shall conform to the requirements in Article 3.4.6.9.

3) The depth of a *tapered tread* shall be not less than its *run* at any point and not more than its *run* at any point plus 25 mm.

9.8.4.4. Uniformity and Tolerances for Risers, Runs and Treads

1) Except as provided in Sentence (2), risers shall be of uniform height in any one *flight*, with a maximum tolerance of

a) 5 mm between adjacent treads or landings, and

b) 10 mm between the tallest and shortest risers in a *flight*.

2) Except for required *exit* stairs, where the top or bottom riser in a stair adjoins a sloping finished walking surface, such as a garage floor, driveway or sidewalk, the height of the riser across the stair shall vary by not more than 1 in 12.

3) Rectangular treads shall have a uniform *run* with a maximum tolerance of

a) 5 mm between adjacent treads, and

b) 10 mm between the deepest and shallowest treads in a *flight*.

4) *Tapered treads* in a *flight* shall have a uniform *run* in accordance with the construction tolerances stipulated in Sentence (3) when measured at a point 300 mm from the centre line of the handrail as described in Sentence 9.8.7.1.(5).

5) The slope of treads shall not exceed 1 in 50.

9.8.4.5. Reserved

9.8.4.6. Winders

(See Note A-9.8.4.6.)

1) Individual treads in winders shall turn through an angle of

a) 30° with no deviation above or below 30°, or

b) 45° with no deviation above or below 45°.

2) Where winders are incorporated into a stair, each set shall not turn through more than 90°.

3) Treads in winders shall have a *run*, measured at a point 200 mm from the narrow end of the tread, conforming to the minimum *run* requirements for a private stair in Table 9.8.4.2.

9.8.4.7. Reserved

9.8.4.8. Tread Nosings

See Notes A-9.8.4.8. and A-9.8.4.)

1) Except as permitted by Sentence (2), the top of the nosings of stair treads shall have a rounded or beveled edge extending not less than 6 mm and not more than 14 mm measured horizontally from the front of the nosing.

2) If resilient material is used to cover the nosing of a stair tread, the minimum extension of the rounded or beveled edge required by Sentence (1) is permitted to be reduced to 3 mm.

9.8.5. Ramps

9.8.5.1. Application

1) This Subsection applies to pedestrian ramps, except ramps in an *accessible* path of travel.

2) Ramps in an *accessible* path of travel shall conform to the requirements in Section 3.8.

9.8.5.2. Ramp Width

(See also Article 9.9.3.2.)

1) Except as provided in Sentence (2), ramps shall be not less than 1 100 mm wide.

2) Ramps serving a single *dwelling unit* shall be not less than 860 mm wide.

9.8.5.3. Height over Ramps

1) The clear height over ramps shall be not less than 2 050 mm.

9.8.5.4. Ramp Slope

1) The slope of ramps shall be not more than

a) 1 in 10 for exterior ramps,

b) 1 in 10 for interior ramps serving *residential occupancies*,

c) 1 in 6 for *industrial occupancies*, and

d) 1 in 8 for all other *occupancies*.

9.8.5.5. Maximum Rise

1) Where the slope of the ramp is greater than 1 in 12, the maximum rise between floors or landings shall be 1 500 mm.

9.8.6. Landings

9.8.6.1. Application

1) This Subsection applies to landings, except landings for ramps in an *accessible* path of travel.

2) Landings for ramps in an *accessible* path of travel shall conform to the requirements in Section 3.8.

3) Finished floors, and ground surfaces with a slope not exceeding 1 in 50, at the top and bottom of stairs or ramps shall be considered as landings.

9.8.6.2. Required Landings

1) Except as provided in Sentences (2) to (4) and Sentence 9.9.6.6.(2), a landing shall be provided

a) at the top and bottom of each *flight* of interior and exterior stairs, including stairs in garages,

b) at the top and bottom of every ramp with a slope greater than 1 in 50,

c) where a doorway opens onto a stair or ramp,

d) where a ramp opens onto a stair, and

e) where a stair opens onto a ramp.

2) Where a door at the top of a stair within a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.

3) A landing may be omitted at the top of an exterior *flight* serving a secondary entrance to a single *dwelling unit*, provided

a) the stair does not contain more than 3 risers,

b) the principal door is a sliding door or swings away from the stair, and

c) only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

4) A landing may be omitted at the bottom of an exterior stair or ramp provided there is no obstruction, such as a gate or door, within the lesser of the width of the stair or ramp or

a) 900 mm for stairs or ramps serving a single *dwelling unit*, and

b) 1 100 mm for stairs or ramps not serving a single *dwelling unit*.

9.8.6.3. Dimensions of Landings

(See Note A-3.4.6.4.) (See also Articles 9.9.6.1. and 9.9.6.6. regarding landings in *exits*.)

1) Except as provided in Sentences (2) to (7), landings shall be at least as wide and as long as the width of the stair or ramp in which they occur.

2) Where the landing in a stairway or ramp does not turn or turns less than 90°, the length of the landing need not be more than the lesser of

a) the required width of the stair or ramp, or

b) 1 100 mm.

3) The length of a landing shall be measured perpendicular to the nosings of adjacent steps or to the end of the ramp, at a distance equal to half the length required in Sentence (2) from the narrow edge of the landing.

4) Where stair *flights* or ramps of different widths adjoin a single landing, the minimum width of the landing shall be

a) where one or more of the stair or ramp widths do not exceed their respective required widths, not less than the greater required stair or ramp width, or

b) where all of the widths of the stairs or ramps exceed their respective required widths, not less than the lesser actual stair or ramp width.

5) Where a door swings toward a stair, the full arc of the swing shall be over the landing.

6) The slope of landings shall not exceed 1 in 50.

7) Where a doorway or stairway opens onto the side of a ramp, the landing shall extend for a distance of not less than 300 mm on either side of the doorway or stairway, except on a side abutting an end wall.

9.8.6.4. Height over Landings

1) Except as permitted by Sentence (2), the clear height over landings shall be not less than 2 050 mm.

2) The clear height over landings serving a single *dwelling unit* shall be not less than 1 950 mm.

9.8.6.5. Tactile Warning

1) Landings required at the top of a *flight* of stairs shall be provided with tactile walking surface indicators conforming to Subsection 3.8.3., unless the stairs are

a) stairs within *dwelling units* or serving not more than two *dwelling units*,

b) *exit* stairs not normally used for access purposes, and

c) fire escape stairs.

9.8.7. Handrails

9.8.7.1. Required Handrails

1) Except as provided in Sentences (2) to (4), handrails shall be installed on stairs and ramps in accordance with Table 9.8.7.1.

Table 9.8.7.1.
Number of Sides of Stair or Ramp Required to Have a Handrail
Forming Part of Sentence 9.8.7.1.(1)

Location of Stair or Ramp	Handrails Serving Stairs			Handrails Serving Ramps	
	Stairs < 1 100 mm Wide		Stairs ≥ 1 100 mm Wide	Ramps < 1 100 mm Wide	Ramps ≥ 1 100 mm Wide
	Straight	Curved	All	Straight or Curved	All
	Number of Sides Required to Have a Handrail				
Within a *dwelling unit*	1	1	1	1	2
All other locations(1)	1	2	2	2	2

Notes to Table 9.8.7.1.:

(1) See Sentences 9.8.7.1.(2), (3) and (4) for exceptions.

2) Except where a stair or ramp serves not more than two *dwelling units*, at least one handrail shall be located not more than 750 mm from the natural path of travel on the stair or ramp. (See Note A-9.8.7.1.(2).)

3) Handrails are not required for stairs and ramps serving a single *dwelling unit*, where

a) interior stairs have not more than 2 risers,

b) exterior stairs have not more than 3 risers, or

c) ramps rise not more than 400 mm.

4) Only one handrail is required on exterior stairs having more than 3 risers provided such stairs serve not more than one *dwelling unit*.

5) Except for stairs with winders, where a *flight* of stairs within a *dwelling unit* consists of *tapered treads*, one handrail shall be installed along the narrow end of the treads.

9.8.7.2. Continuity of Handrails

(See Note A-9.8.7.2.)

1) Except as provided in Sentence (3), required handrails shall be continuously graspable throughout the length of

a) ramps, and

b) *flights* of stairs, from the bottom riser to the top riser.

2) Except for stairs or ramps serving a single *dwelling unit*, at least one required handrail shall be continuous throughout the length of the stair or ramp, including at the landing except where interrupted by doorways. (See Note A-3.4.6.5.(10).)

3) For stairs or ramps serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces, a handrail is permitted to start from a newel post or volute installed on the bottom tread.

9.8.7.3. Termination of Handrails

1) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Note A-9.8.7.3.(1).)

2) Except for stairs and ramps serving only one *dwelling unit* at least one handrail at the sides of a stair or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of each *flight* or ramp. (See Note A-9.8.7.3.(2).)

9.8.7.4. Height of Handrails

(See Note A-9.8.7.4.)

1) The height of handrails on stairs and ramps shall be measured vertically from the top of the handrail to

a) a straight line drawn tangent to the tread nosings of the stair served by the handrail, or

b) the surface of the ramp, floor or landing served by the handrail.

2) Except as provided in Sentence (3) and Clause 3.8.3.5.(1)(e), required handrails shall be 865 mm to 1070 mm high.

3) Handrails installed in addition to required handrails need not comply with Sentence (2).

9.8.7.5. Ergonomic Design

1) The clearance between a handrail and the surface behind it shall be not less than

a) 50 mm, or

b) where said surface is rough or abrasive, 60 mm.

2) All handrails shall be constructed so as to be continually graspable along their entire length with no obstruction on or above them to break a handhold. (See Note A-9.8.7.5.(2).)

9.8.7.6. Projections into Stairs and Ramps

1) Handrails and constructions below handrails, including handrail supports and stair stringers, shall not project more than 100 mm into the required width of a stair or ramp. (See Note A-9.8.7.6.(1).) (See also Articles 9.8.2.1. and 9.8.5.2.)

9.8.7.7. Design and Attachment of Handrails

(See Note A-9.8.7.7.)

1) Handrails and their supports shall be designed and constructed to withstand the following loads, which need not be considered to act simultaneously:

a) a concentrated load of not less than 0.9 kN applied at any point and in any direction for all handrails, and

b) for handrails other than those serving a single *dwelling unit*, a uniform load of not less than 0.7 kN/m.

2) Where exterior or interior handrails serving a single *dwelling unit* are attached to wood studs or blocking, the attachment shall be deemed to comply with Sentence (1), where

a) the attachment points are spaced not more than 1.2 m apart measured on the horizontal plane,

b) the first attachment point at either end is located no more than 300 mm from the end of the handrail, and

c) the fasteners consist of not less than 2 No. 8 wood screws at each point, penetrating not less than 32 mm into solid wood.

9.8.8. Guards

9.8.8.1. Required Guards

(See Note A-9.8.8.1.)

1) Except as provided in Sentence (2), every surface to which access is provided, including but not limited to *flights* of steps and ramps, exterior landings, porches, balconies, *mezzanines*, galleries and raised *walkways*, shall be protected by a *guard* on each side that is not protected by a wall for the length where

a) there is a difference in elevation of more than 600 mm between the walking surface and the adjacent surface,

b) the adjacent surface within 1.2 m of the walking surface has a slope of more than 1 in 2,

c) an interior stair has more than 2 risers, and

d) an interior ramp rises more than 400 mm

2) *Guards* are not required

a) at loading docks,

b) at floor pits in *repair garages*, or

c) where access is provided for maintenance purposes only.

3) Doors in *buildings* of *residential occupancy*, where the finished floor on one side of the door is more than 600 mm above the floor or other constructed surface or ground level on the other side of the door, shall be protected by

a) a *guard*, or

b) a mechanism capable of controlling the free swinging or sliding of the door so as to limit any clear unobstructed opening to not more than 100 mm.

4) Except as provided in Sentence (5), openable windows in *buildings* of *residential occupancy* shall be protected by

a) a *guard*, or

b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm measured either vertically or horizontally where the other dimension is greater than 380 mm.

(See Note A-9.8.8.1.(4).)

5) Windows need not be protected in accordance with Sentence (4), where

a) **reserved**,

b) **reserved**,

c) the only opening greater than 100 mm by 380 mm is a horizontal opening at the top of the window, and

i) construction below the opening does not facilitate climbing, and

ii) guards are provided where required by this Subsection,

d) **deleted**, or

e) the window is located in a room or space with the finished floor described in Clause (c) located less than 1 800 mm above the floor or ground on the other side of the window.

(See Note A-9.8.8.1.(4).)

6) Except as provided in Sentence (7), glazing installed over *stairs*, ramps and landings that extends to less than 1 070 mm above the surface of the treads, ramp or landing shall be

a) protected by *guards*, in accordance with this Subsection, or

b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

7) In *dwelling units*, glazing installed over *stairs*, ramps and landings that extends to less than 900 mm above the surface of the treads, ramp or landing shall be

a) protected by *guards*, in accordance with this Subsection, or

b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

8) Glazing installed in public areas that extends to less than 1 m from the floor and is located above the second *storey* in *buildings* of *residential occupancy* shall be

a) protected by *guards* in accordance with this Subsection, or

b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

9) Swimming pools greater than 450 mm deep shall be enclosed within a sturdy fence no less than 1.22 m in height, with no openings in it greater than 100 mm, and with no member, attachment, or opening located between 100 mm and 900 mm above ground level which could facilitate climbing, except that heavy gauge chain link fencing with a maximum opening size of 35 mm square may be considered *acceptable* fencing for this purpose. (See Note A-9.8.8.1.(9) and (10).)

10) The fence described in Sentence (9)

a) shall enclose the pool and the principle *building* on the premises, except that the fence may enclose the pool separately if the pool is entirely visible from the principle *building* or through the fence, and

b) shall be continuous, except for points of access which shall be equipped with a self-closing gate, secured by a spring lock located no less than 1 070 mm above grade, and only openable from the pool side of the fence.

9.8.8.2. Loads on Guards

(See Note A-9.8.8.2.)

1) Except as provided in Sentences (2) and (4), *guards* shall be designed to resist the specified loads prescribed in Table 9.8.8.2.

Table 9.8.8.2.
Specified Loads for Guards
Forming Part of Sentence 9.8.8.2.(1)

Location of *Guard*	Minimum Specified Loads		
	Horizontal Load Applied Inward or Outward at any Point at the Minimum Required Height of the *Guard*	Horizontal Load Applied Outward on Elements Within the *Guard*, Including Solid Panels and Balusters	Evenly Distributed Vertical Load Applied at the Top of the *Guard*
Guards within *dwelling units* and exterior *guards* serving not more than 2 *dwelling units*	0.5 kN/m OR concentrated load of 1.0 kN applied at any point(1)	0.5 kN applied over a maximum width of 300 mm and a height of 300 mm(2)	1.5 kN/m
Guards serving access ways to equipment platforms and similar areas where the gathering of many people is improbable	Concentrated load of 1.0 kN applied at any point	Concentrated load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point on the element or elements so as to produce the most critical effect	1.5 kN/m
All other *guards*	0.75 kN/m OR concentrated load of 1.0 kN applied at any point(1)	Concentrated load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point on the element or elements so as to produce the most critical effect	1.5 kN/m

Notes to Table 9.8.8.2.:

(1) The load that creates the most critical condition shall apply.

(2) See Sentence (2).

2) For *guards* within *dwelling units* and for exterior *guards* serving not more than 2 *dwelling units*, where the width and spacing of balusters are such that 3 balusters can be engaged by a load imposed over a 300 mm width, the load shall be imposed so as to engage 3 balusters.

3) None of the loads specified in Table 9.8.8.2. need be considered to act simultaneously.

4) For *guards* within *dwelling units* and for exterior *guards* serving not more than 2 *dwelling units*, Table 9.8.8.2. need not apply where the *guard* construction used has been demonstrated to provide effective performance.

9.8.8.3. Height of Guards

(See Note A-9.8.8.3.)

1) Except as provided in Sentences (2) to (4), all *guards* shall be not less than 1 070 mm high.

2) All *guards* within *dwelling units* shall be not less than 900 mm high.

3) Exterior *guards* serving not more than one *dwelling unit* shall be not less than 900 mm high where the walking surface served by the *guard* is not more than 1 800 mm above the finished ground level.

4) *Guards* for *flights* of steps, except in required *exit* stairs, shall be not less than 900 mm high.

5) The height of *guards* for *flights* of steps shall be measured vertically from the top of the *guard* to a line drawn through the tread nosing served by the *guard*.

9.8.8.4. Guards for Floors and Ramps in Garages

1) Except for floors of garages referred to in Section 9.35., where garage floors or ramps are 600 mm or more above the adjacent ground or floor level, every opening through a garage floor and the perimeter of floors and ramps that have no exterior walls shall be provided with

a) a continuous curb not less than 140 mm in height, and

b) a *guard* not less than 1 070 mm above the floor level.

2) Vehicle guardrails shall be designed and constructed to withstand the loading values stipulated in Sentence 4.1.5.15.(1). (See Note A-4.1.5.14. and 4.1.5.15.(1).)

9.8.8.5. Openings in Guards

1) Except as permitted in Sentences (2) and (3), openings through *guards* shall be of a size that prevents the passage of a spherical object having a diameter of 100 mm. (See Note A-9.8.8.5.(1) and (2).)

2) Except where they serve *storage garages*, *guards* in *industrial occupancies* are permitted to consist of

a) a top railing, and

b) one or more horizontal intermediate rails spaced such that the size of the openings through the *guard* prevents the passage of a spherical object having a diameter of 535 mm.

(See Note A-9.8.8.5.(1) and (2).)

3) Openings through any *guard* that is not required by Article 9.8.8.1. and that serves an *occupancy* other than an *industrial occupancy* shall be of a size that

a) prevents the passage of a spherical object having a diameter of 100 mm, or

b) permits the passage of a spherical object having a diameter of 200 mm.

(See Note A-9.8.8.5.(3).)

9.8.8.6. Design of Guards to Not Facilitate Climbing

1) Except for *guards* in *industrial occupancies*, *guards* required by Article 9.8.8.1. shall be designed so that no member, attachment or opening located between 140 mm and 900 mm above the level protected by the *guard* facilitates climbing. (See Note A-9.8.8.6.(1).)

9.8.8.7. Glass in Guards

1) Glass in *guards* shall be

a) safety glass of the laminated or tempered type conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or

b) wired glass conforming to CAN/CGSB-12.11-M, "Wired Safety Glass."

9.8.8.8. Glass Guards

1) All glass guards shall have a top rail capable of transferring the guard loads to adjacent glass panels or, in the event of the failure of a glass panel, to the structural component of the *building*.

9.8.9. Construction

9.8.9.1. Loads on Stairs and Ramps

1) Except as specified in Articles 9.8.9.4. and 9.8.9.5., stairs and ramps shall be designed for strength and rigidity under uniform loading criteria to support specified loads of

a) 1.9 kPa for stairs and ramps serving not more than one *dwelling unit*, and

b) 4.8 kPa for other stairs and ramps.

9.8.9.2. Exterior Concrete Stairs

1) Exterior concrete stairs with more than 2 risers and 2 treads shall be

a) supported on unit masonry or concrete walls or piers not less than 150 mm in cross section, or

b) cantilevered from the main *foundation* wall.

2) Stairs described in Sentence (1), when cantilevered from the *foundation* wall, shall be constructed and installed in conformance with Subsection 9.8.10.

3) The depth below ground level for *foundations* for exterior steps shall conform to the requirements in Section 9.12.

9.8.9.3. Exterior Wood Steps

1) Exterior wood steps shall not be in direct contact with the ground unless suitably treated with a wood preservative.

9.8.9.4. Wooden Stair Stringers

1) Wooden stair stringers shall

a) have a minimum effective depth of 90 mm, measured perpendicularly to the bottom of the stringer at the point of minimum cross-section, and an overall depth of not less than 235 mm,

b) be supported and secured top and bottom,

c) be not less than 25 mm actual thickness if supported along their length and 38 mm actual thickness if unsupported along their length, and

d) except as permitted in Sentence (2), be spaced not more than 900 mm o.c. in stairs serving not more than one *dwelling unit* and 600 mm o.c. in other stairs.

2) For stairs serving not more than one *dwelling unit*, where risers support the front portion of the tread, the space between stringers shall be not more than 1 200 mm.

9.8.9.5. Treads

1) Stair treads of lumber, plywood or O-2 grade OSB within *dwelling units* shall be not less than 25 mm actual thickness, except that if open risers are used and the distance between stringers exceeds 750 mm, the treads shall be not less than 38 mm actual thickness.

2) Stair treads of plywood or OSB that are not continuously supported by the riser shall have their face grain or direction of face orientation at right angles to the stringers.

9.8.9.6. Finish for Treads and Landings

1) The finish for treads and landings of interior stairs in *dwelling units*, other than stairs to unfinished *basements*, shall consist of hardwood, vertical grain softwood, resilient flooring or other material providing equivalent performance.

2) Treads and landings of interior and exterior stairs and ramps, other than those within *dwelling units* shall have a slip-resistant finish or be provided with slip-resistant strips that extend not more than 1 mm above the surface.

9.8.10. Cantilevered Precast Concrete Steps

9.8.10.1. Design

1) Exterior concrete steps and their anchorage system that are cantilevered from a *foundation* wall shall be designed and installed to support the loads to which they may be subjected.

9.8.10.2. Anchorage

1) Cantilevered concrete steps referred to in Article 9.8.10.1. shall be anchored to concrete *foundation* walls not less than 200 mm thick.

9.8.10.3. Prevention of Damage Due to Frost

1) Suitable precautions shall be taken during backfilling and grading operations to ensure that subsequent freezing of the *soil* will not cause uplift forces on the underside of cantilevered concrete steps to the extent that the steps or the walls to which they are attached will be damaged.