

PART 3.9.1 STAIR CONSTRUCTION

Acceptable construction practice

3.9.1.1 Application

Compliance with this Part satisfies *Performance Requirement P2.5.1*, provided the stair complies with the appropriate structural requirements of the *Housing Provisions*.

3.9.1.2 General requirements

- (a) Stairs serving *habitable rooms*, including external stairs must comply with 3.9.1.3 and 3.9.1.4.

3.9.1.2(b) Amdt No. 8

- (b) Stairs serving only *non-habitable rooms*, such as attics, storerooms and the like that are not used on a regular or daily basis, must be constructed in accordance with—
- (i) the provisions of this Part; or
 - (ii) AS 1657—Fixed platforms, walkways, stairways and ladders.

3.9.1.3 Stair construction

3.9.1.3 Amdt No. 8

Stairs must be constructed in accordance with the following:

- (a) Each *flight* must have not more than 18 nor less than 2 *risers*.
- (b) The nominal dimension of *goings* and *risers* of a stair must be constant throughout each stair *flight* except that the *going* of *winders* in lieu of a quarter or half *landing* may vary from the *going* of the straight treads within the same *flight* provided that the *going* of all such *winders* is constant.
- (c) Treads must be of solid construction (not mesh or other perforated material) if the stairway is more than 10 m high or connects more than 3 storeys.
- (d) A *flight* of stairs must not have more than 3 *winders* in lieu of each quarter *landing* or 6 *winders* in lieu of each half *landing*.
- (e) The *riser* opening must not allow a 125 mm sphere to pass through between the treads.
- (f) * * * * *
- (g) Treads must have a slip-resistant finish or a suitable non-skid strip near the edge of the nosings.
- (h) *Landings* must—
 - (i) be not less than 750 mm long and where this involves a change in direction, the length is measured 500 mm from the inside edge of the *landing* (see Figure 3.9.1.5, Diagram a); and
 - (ii) have a gradient not steeper than 1:50; and
 - (iii) be provided where the sill of a threshold of a doorway opens on to a stair that provides a change in floor level or floor to ground level greater than 3 *risers* or 570 mm (see Figure 3.9.1.5, Diagram b).

3.9.1.4 Riser and going dimensions

3.9.1.4 Amdt No. 8

The *riser* and *going* dimensions for each *flight*, except for the *going* of *winders* in lieu of a quarter or half *landing*, must comply with the following:

- (a) The *going* (G), *riser* (R) and slope relationship quantity (2R+G) must be in accordance with Figure 3.9.1.2.
- (b) The point for measurement of the *going* (G) in the slope relationship quantity as described in Figure 3.9.1.3 must be—
- (i) for *tapered treads* (other than treads in a *spiral stair*)—
- (A) not more than 1 m wide, the middle of the unobstructed width of the stair (see Figure 3.9.1.3, Diagram b) and
 - (B) more than 1 m in width, 400 mm from the unobstructed width of each side of the stair (see Figure 3.9.1.3, Diagram c); and
- (ii) for treads in *spiral stairs*, the point seven tenths of the unobstructed distance from the face of the centre pole or support towards the handrail side (see Figure 3.9.1.4).

Figure 3.9.1.2
STAIR RISER AND GOING DIMENSIONS (mm)

STAIR TYPE	RISER (R)		GOING (G)		SLOPE RELATIONSHIP (2R+G)	
	(see Figure below)		(see Figure below)		(2R+G)	
	Max	Min	Max	Min	Max	Min
Stairs (other than spiral)	190	115	355	240	700	550
Spiral	220	140	370	210	680	590

125 mm sphere must not pass through treads

Fig 3.9.1.3 Amdt No. 7

Figure 3.9.1.3
MEASUREMENT OF SLOPE RELATIONSHIP—Plan view

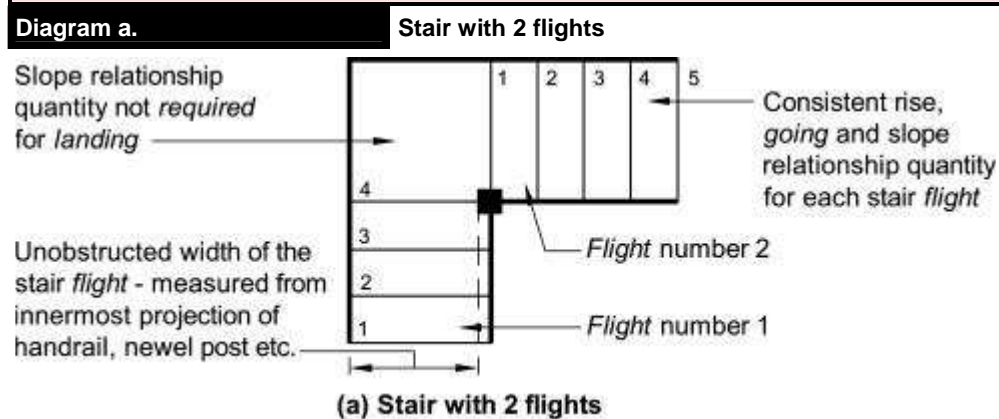
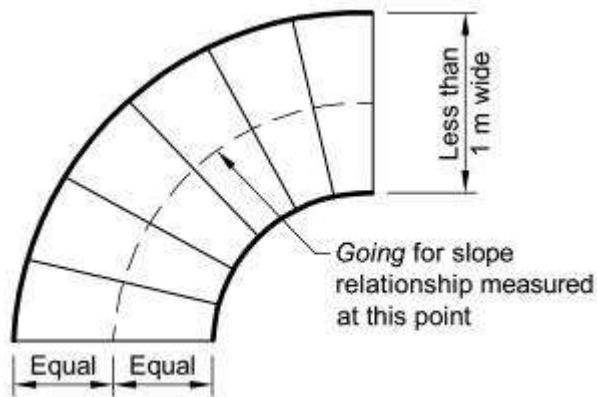
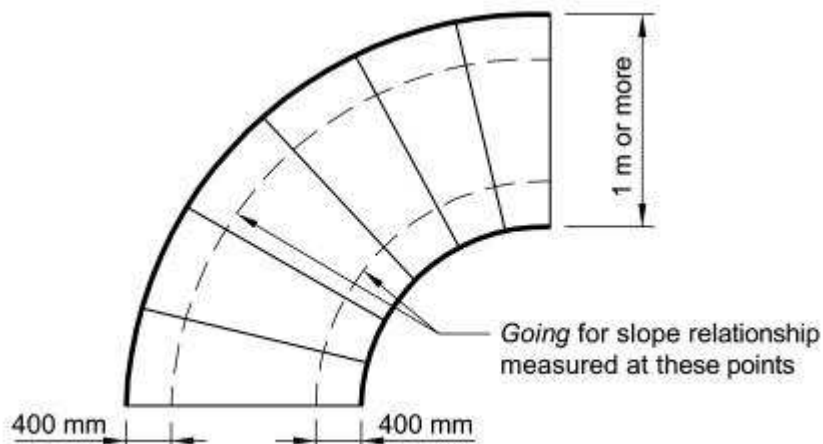


Diagram b. Tapered treads—less than 1 m wide



(b) Tapered treads - less than 1 m wide

Diagram c. Tapered treads—1 m or more in width

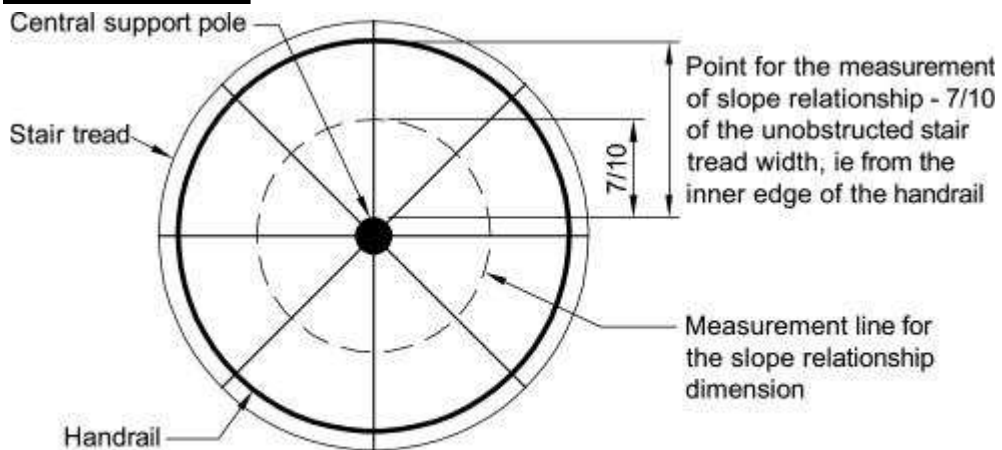


(c) Tapered treads - 1 m or more in width

Fig 3.9.1.4 Amdt No. 8

Figure 3.9.1.4
SPIRAL STAIRS

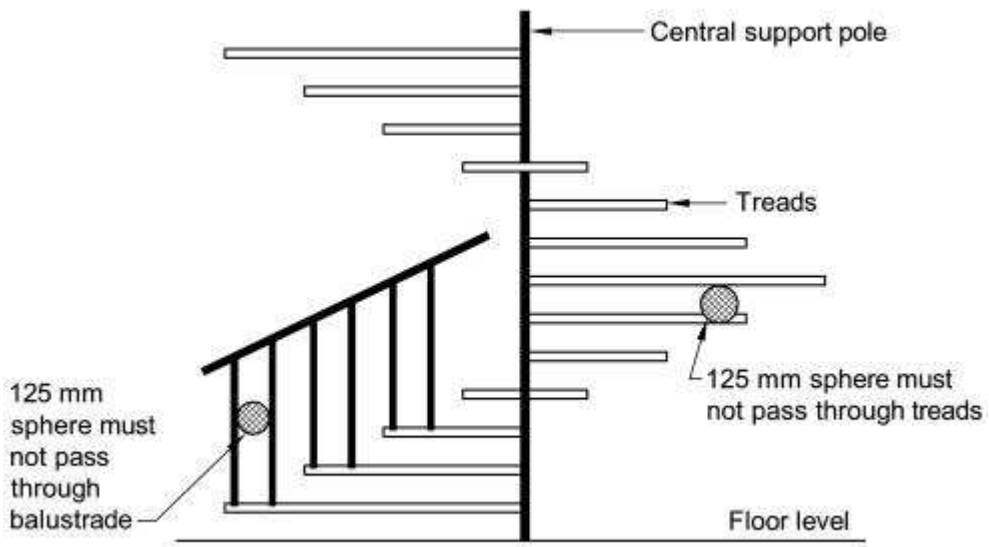
Diagram a. Measurement for slope relationship



(a) Measurement for slope relationship

Diagram b.

Measurement for openings in stairs



(b) Measurement for openings in stairs

Fig 3.9.1.5 Amdt No. 8

Figure 3.9.1.5
LANDINGS

Diagram a.

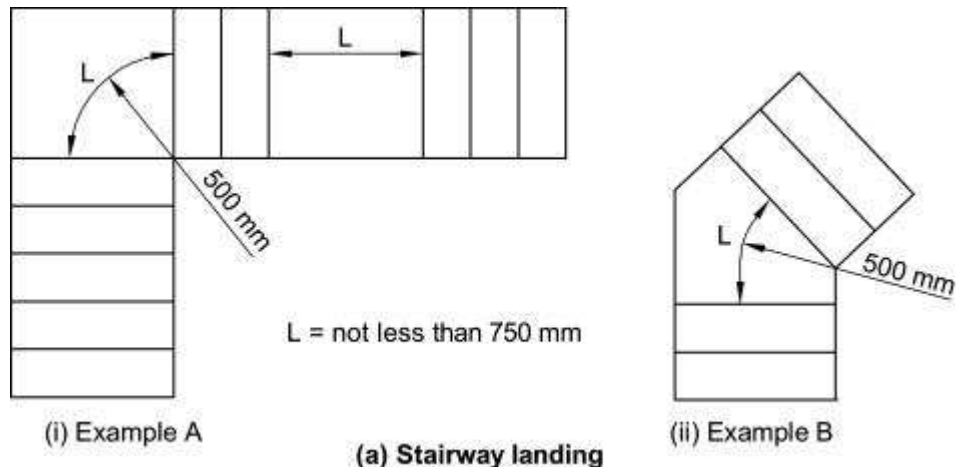
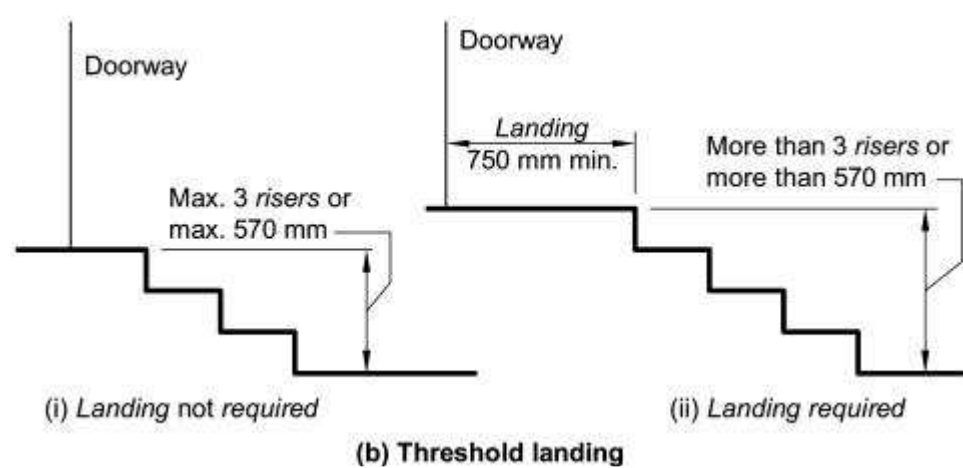


Diagram b.



3.9.1.5 Thresholds

3.9.1.5 amended by BCA 2004

Where a threshold is more than 190 mm above the adjoining surface it must incorporate steps having *riser* and *going* dimensions in accordance with 3.9.1.4

PART 3.9 SAFE MOVEMENT AND ACCESS

2005 Preview Edition

PART 3.9.2 BALUSTRADES

Acceptable construction practice

3.9.2.1 Application

3.9.2.1 Amdt No. 3

Compliance with this Part satisfies *Performance Requirement P2.5.2* for balustrades or other barriers.

3.9.2.2 When balustrades or other barriers are required

3.9.2.2 Amdt No. 9

- (a) A continuous balustrade or other barrier must be provided along the side of any roof to which public access is provided, any stairway or ramp, any floor, corridor, hallway, balcony, verandah, mezzanine, access bridge or the like and along the side of any path of access to a building, if—
 - (i) it is not bounded by a wall; and
 - (ii) any level is more than 1 m above the surface beneath (see [Figure 3.9.2.3](#)).
- (b) The requirements of (a) do not apply to a *window* opening.

3.9.2.3 Balustrades or other barrier construction

Clause 3.9.2.3 amended by BCA 2005

- (a) The height of a balustrade or other barrier must be in accordance with the following:
 - (i) The height must not be less than 865 mm above the nosings of the stair treads or the floor of a ramp.
 - (ii) The height must not be less than—
 - (A) 1 m above the floor of any access path, balcony, *landing* or the like (see [Figure 3.9.2.1](#)); or
 - (B) 865 mm above the floor of a *landing* to a stair or ramp where the balustrade or other barrier is provided along the inside edge of the *landing* and is not more than 500 mm long.
- (b) A transition zone may be incorporated where the balustrade or other barrier height changes from 865 mm on the stair *flight* or ramp to 1 m at the *landing* (see [Figure 3.9.2.2](#)).
- (c) Openings in balustrades (including decorative balustrades) or other barriers must be constructed so that any opening does not permit a 125 mm sphere to pass through it and for stairs, the space is tested above the nosing line.
- (d) A balustrade or other barrier must be designed to take loading forces in accordance with [AS 1170.1](#) or [AS/NZS 1170.1](#).
- (e) For floors more than 4 m above the surface beneath, any horizontal elements within the balustrade or other barrier between 150 mm and 760 mm above the floor must not facilitate climbing.
- (f) A wire balustrade must be constructed in accordance with the following and is deemed to meet the requirements of (c):

- (i) For horizontal wire systems—
 - (A) when measured with a strain indicator, it must be in accordance with the tension values in [Table 3.9.2.1](#); or
 - (B) must not exceed the maximum deflections in [Table 3.9.2.1](#).
- (ii) For non-continuous vertical wire systems, when measured with a strain indicator, must be in accordance with the tension values in [Table 3.9.2.1](#).
- (iii) For continuous vertical or continuous near vertical sloped wire systems—
 - (A) must have wires of no more than 2.5 mm diameter with a lay of 7×7 or 7×19 construction; and
 - (B) changes in direction at support rails must pass around a pulley block without causing permanent deformation to the wire; and
 - (C) must have supporting rails, constructed with a spacing of not more than 800 mm, of a material that does not allow deflection that would decrease the tension of the wire under load; and
 - (D) when the wire tension is measured with a strain indicator, it must be in accordance with the tension values in [Table 3.9.2.2](#) and measured in the furthest span from the tensioning device.

Explanatory information:

1. For the purpose of this clause, a wire balustrade consist of a series of tensioned wire rope connected to either vertical or horizontal supports serving as a guard to minimise the risk of a person falling from a roof, stairway, raised floor level or the like.
2. A wire balustrade excludes wire mesh fences and the like.
3. To assist in the application of [3.9.2.3\(f\)](#), the the following terms have been defined:
 - (a) Continuous – where the wire spans three or more supports.
 - (b) Non-continuous – where the wire only spans between two supports.
 - (c) Pulley block – a device consisting of a wheel in which a wire runs around to change its direction.
 - (d) Permissible deflection – is the allowable bending of the wire.
 - (e) Support rails – are horizontal components of the balustrade system that span across the top and bottom to provide structural support.
4. [Tables 3.9.2.1](#) and [3.9.2.2](#) contains tension and deflection requirements for wires in vertical and horizontal wire balustrades systems with varying post spacings, wire spacings and wire types. The figures contained in the table were derived from testing the spacing combinations in order to prevent the passage of a 125 mm diameter solid cone penetrating between the wires at a predetermined force.
5. Care needs to be taken to ensure that wire tension will be maintained during the life of the balustrade. In some situations, it may be necessary to incorporate "lock-off" devices to prevent to loosening of the wire.
6. Likewise, if a threaded anchor bears against a soft wood post or rail, the anchor may indent the post or rail, thus loosening the wire.
7. Temperature effects on the tension of the wire may be significant but there is little that can be done to allow for temperature variation in service. The shorter the wire span, the lesser the effect will be.
8. Stainless steel wire with a lay of 1 x 19 has the greatest elastic modulus and will take up the same load with less extension than equivalent wires with other lays.

Table 3.9.2.1 WIRE BALUSTRADE CONSTRUCTION - REQUIRED WIRE TENSION (T) AND MAXIMUM PERMISSIBLE DEFLECTION (D) Support (post or rail) Spacing (mm)		Stainless Steel Wire												Galvanised Steel Wire			
		Wire Diameter (mm) and Lay															
		2.5	2.5			3.0			3.0	4.0	4.0			4.0	3.25		
		7 x 7	1 x 19			1 x 19			7 x 7	7 x 7	7 x 19			1 x 19	1 x 6		
		Wire Spacing (mm)															
60	60	80	100	60	80	100	60	60	60	80	100	60	60	80	100		
600	T	6	35	420	1140	85	325	1090	81	29	155	394	1038	6	45	240	1060
	D	20	20	9	2	19	8	2	19	18	18	8	3	18	30	10	3
800	T	198	218	630	1565	183	555	1500	242	213	290	654	1412	127	140	537	1540
	D	13	13	7	2	16	6	2	16	14	14	7	3	14	23	7	3
900	T	294	310	735	N/A	261	670	1705	323	242	358	785	1598	242	188	685	1780
	D	11	11	5	N/A	13	6	2	13	12	12	6	3	12	20	6	3
1000	T	390	402	840	N/A	340	785	1910	404	329	425	915	1785	358	235	853	N/A
	D	10	10	5	N/A	11	6	2	11	10	10	5	3	10	17	6	N/A
1200	T	583	585	1050	N/A	520	1015	N/A	525	519	599	1143	2165	525	435	1190	N/A
	D	9	9	5	N/A	8	6	N/A	8	8	8	4	2	8	10	N/A	N/A
1500	T	860	810	1400	N/A	790	1330	N/A	681	785	860	1485	2745	785	735	N/A	N/A
	D	8	8	5	N/A	7	5	N/A	7	8	8	4	2	8	10	N/A	N/A
1800	T	1100	1125	1750	N/A	1025	1725	N/A	980	1050	1080	1860	N/A	1000	1150	N/A	N/A
	D	8	8	N/A	N/A	7	5	N/A	7	7	8	4	N/A	8	10	N/A	N/A
2000	T	1229	1325	N/A	N/A	1180	1980	N/A	1171	1188	1285	2105	N/A	1090	N/A	N/A	N/A
	D	8	8	N/A	N/A	7	5	N/A	7	7	7	4	N/A	7	N/A	N/A	N/A
2500	T	1581	N/A	N/A	N/A	N/A	N/A	N/A	1483	1719	1540	2615	N/A	1488	N/A	N/A	N/A
	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	7	4	N/A	7	N/A	N/A	N/A

Notes:

1. Tension (T) = when measured with a strain indicator the minimum required tension of the wire balustrades in Newtons (N)
2. Deflection (D) = maximum permissible deflection in (mm) of the wire balustrades when a 2 kg mass is suspended mid-span between the posts
3. Lay = number of strands by the number of individual wires in each strand. For example 7 x 19 = 7 strands, each with 19 individual wires in each strand
4. Galvanised Steel Wire is only to be used in straight run applications
5. Where a change of direction is made in the run of a wire , the tensioning device is to be placed at the end of the longest span.
6. N/A = wire balustrades not allowed in this situation

Table 3.9.2.2 CONTINUOUS VERTICAL WIRE BALUSTRADE CONSTRUCTION – REQUIRED WIRE TENSION	Widest Spacing Between Wires (mm)	Tension (N)
Minimum Lay		
7x7	80	20
or	105	285
7x19	120	850

Note:

Lay = number of strands by the number of individual wires in each strand. For example:

Lay 7 x 19 = 7 strands, each with 19 individual wires in each strand

Figure 3.9.2.1 Amdt No. 5

Explanatory Information

The Table only includes 7 x 7 and 7 x 19 wires due to other wires not having sufficient flexibility to make the necessary turns.

Figure 3.9.2.1
BALUSTRADE OR OTHER BARRIER CONSTRUCTION

Note: For the purposes of this Figure, a 125 mm sphere must not pass between rails or through the gap when tested above the nosing line.

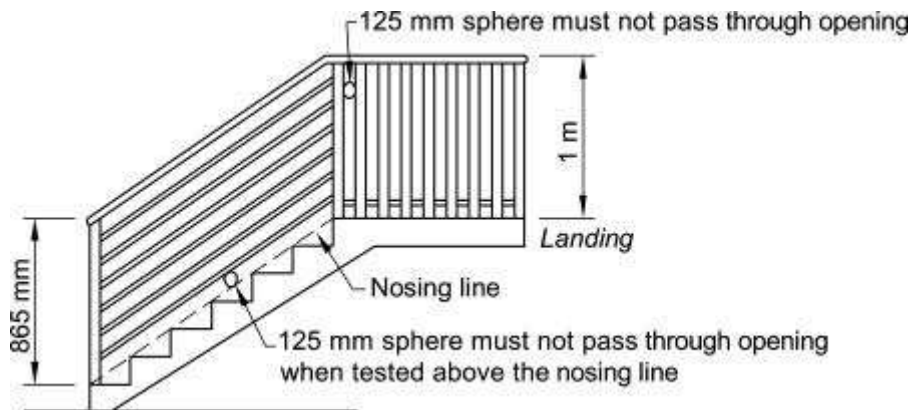


Figure 3.9.2.2 Amdt No. 5

Figure 3.9.2.2
TRANSITION ZONES

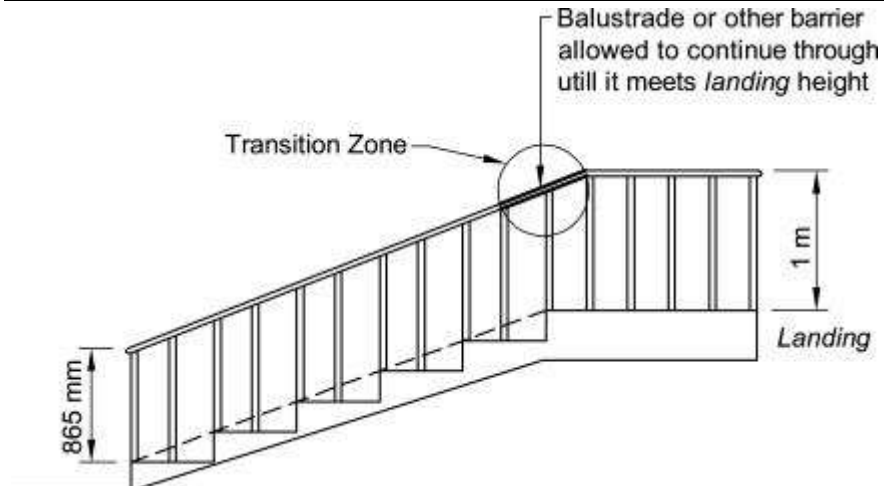


Figure 3.9.2.3 Amdt No. 5

Figure 3.9.2.3

BALUSTRADES OR OTHER BARRIERS—WHEN REQUIRED

