

# K

## **Stairways, Ladders, Ramps and Guards**

## **Building Regulations 2014**

## **Technical Guidance Document**



**Comhshaol, Pobal agus Rialtas Áitiúil**  
Environment, Community and Local Government





# Building Regulations 2014

## Technical Guidance Document K

### Stairways, Ladders, Ramps and Guards

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# Building Regulations 2014

## Technical Guidance Document K

### Stairways, Ladders, Ramps and Guards

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#### **Introduction**

This document has been published by the Minister for the Environment, Community and Local Government under article 7 of the Building Regulations 1997. It provides guidance in relation to Part K of the Second Schedule to the Regulations. The document should be read in conjunction with the Building Regulations 1997 to 2014, and other documents published under these Regulations.

In general, Building Regulations apply to the construction of new buildings and to extensions and material alterations to buildings. In addition, certain parts of the Regulations apply to existing buildings where a material change of use takes place. Otherwise, Building Regulations do not apply to buildings constructed prior to 1 June, 1992.

#### **Transitional arrangements**

In general, this document applies to works, or buildings in which a material change of use takes place, where the works or the change of use commence or takes place, as the case may be, on or after 1 January 2015. Technical Guidance Document K - Stairways, Ladders, Ramps and Guards, dated 1997, also ceases to have effect from that date.

#### **The Guidance**

The materials, methods of construction, standards and other specifications (including technical specifications) which are referred to in this document are those which are likely to be suitable for the purposes of the Regulations. Where works are carried out in accordance with the guidance in this document, this will, prima facie, indicate compliance with Part K of the Second Schedule to the Building Regulations. However, the adoption of an approach other than that outlined in the guidance is not precluded provided that the relevant requirements of the Regulations are complied with. Those involved in the design and construction of a building may be required by the relevant building control

authority to provide such evidence as is necessary to establish that the requirements of the Building Regulations are being complied with.

#### **Existing buildings**

In the case of material alterations or changes of use of existing buildings, the adoption without modification of the guidance in this document may not, in all circumstances, be appropriate. In particular, the adherence to guidance, including codes, standards or technical specifications, intended for application to new work may be unduly restrictive or impracticable. Buildings of architectural or historical interest are especially likely to give rise to such circumstances. In these situations, alternative approaches based on the principles contained in the document may be more relevant and should be considered.

#### **Technical Specifications**

Building Regulations are made for specific purposes, e.g. to provide, in relation to buildings, for the health, safety and welfare of persons, the conservation of energy and access for people with disabilities. Technical specifications (including harmonised European Standards, European Technical Assessments, National Standards and Agrément Certificates) are relevant to the extent that they relate to these considerations. Any reference to a technical specification is a reference to so much of the specification as is relevant in the context in which it arises. Technical specifications may also address other aspects not covered by the Regulations.

A reference to a technical specification is to the latest edition (including any amendments, supplements or addenda) current at the date of publication of this Technical Guidance Document. However, if this version of the technical specification is subsequently revised or updated by the issuing body, the new version may be used as a source of guidance provided that it continues to address the relevant

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requirements of the Regulations.

### **Materials and workmanship**

Under Part D of the Second Schedule to the Building Regulations, building work to which the Regulations apply must be carried out with proper materials and in a workmanlike manner. Guidance in relation to compliance with Part D is contained in Technical Guidance Document D.

### **Interpretation**

In this document, a reference to a section, sub-section, part, paragraph or diagram is, unless otherwise stated, a reference to a section, sub-section, part, paragraph or diagram, as the case may be, of this document. A reference to another Technical Guidance Document is a reference to the latest edition of a document published by the Minister for the Environment, Community and Local Government under article 7 of the Building Regulations, 1997. Diagrams are used in this document to illustrate particular aspects of construction - they may not show all the details of construction.

# Stairways, Ladders, Ramps and Guards

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## Part K - The Requirement

Part K of the Second Schedule to the Building Regulations 1997 to 2014 provides as follows:

Stairways, ladders and ramps.	K1	Stairways, ladders and ramps shall be such as to afford safe passage for the users of a building.
Protection from falling.	K2	In a building the sides of every floor, balcony and every part of a roof to which people normally have access, and sunken areas connected to a building, shall be guarded to protect users from the risk of falling.
Vehicle ramps, floors and roofs.	K3	In a building, the sides of every vehicle ramp and every floor and roof to which vehicles have access shall be guarded against the risk of vehicles falling therefrom.
Application of this Part.	K4	The requirements of this Part apply to stairways, ladders and ramps which form part of the structure of a building.

This Technical Guidance Document is divided into two sections.

Section 1 relates to the Requirement K1 and is divided into two parts.

Sub-section 1.1 deals with stairways and ladders and sub-section 1.2 deals with ramps.

Section 2 relates to the Requirements K2 and K3.

This Document refers to safety glazing in the context of stairways, ramps and guards. For general advice in relation to safety glazing, refer to Technical Guidance Document D.

Technical Guidance Document K provides guidance on the minimum provisions to satisfy the requirements of K1 to K3 for non-complex buildings. However, those involved in the design and construction of complex buildings should pay particular attention to the safety of stairways, ladders, ramps and guards in such buildings. In this regard, a list of useful references is given at the end of this document.



# Section 1

## Stairways, Ladders and Ramps

Stairways, ladders and ramps. K1 Stairways, ladders and ramps shall be such as to afford safe passage for the users of a building.

### Introduction

**1.0** Requirement K1 applies to the design and construction of stairways, ladders and ramps. It does not apply to steps or access routes outside a building other than the circumstances set out in paragraph 1.1.3.

Additional requirements may be necessary for access routes which form part of:-

- (i) means of escape in case of fire (see Technical Guidance Document B);
- (ii) means of access for people with disabilities (see Technical Guidance Document M).

Reference should be made to Technical Guidance Document D for guidance in relation to manufacturing and other tolerances applicable to building components generally.

### Sub-section 1.1

#### Stairways and Ladders

**1.1.1** Paragraphs 1.1.2 to 1.1.20 give some guidance on good practice insofar as it relates to non-complex buildings of normal design and construction.

**1.1.2** In this sub-section –

"flight" means the part of a stairway or ramp between landings;

"going" means the horizontal distance between the nosing of a tread and the nosing of the tread or landing next above it;

"pitch" means the angle between the pitch line and the horizontal;

"rise" means the vertical distance between the top of a tread and the top of the tread, landing or ramp next above or below it;

"stairs" means a succession of steps and landings that make it possible to pass on foot to other levels;

"tapered step" means a step, the nosing of which is not parallel to the nosing of the step or landing next above it;

"tread" means the upper surface of a step.

**1.1.3** In the case of steps immediately outside an external door of a building (i.e. part of the building):

- (a) where there are three steps or less, only the recommendations in Table 1 and par. 1.1.4 apply; and
- (b) where there are more than three steps, all the provisions of this sub-section apply.

For accessible stepped approaches to building entrances, see Technical Guidance Document M – Access and Use.

#### Rise, Going and Pitch

**1.1.4** In any stairs –

- (a) all of the steps should be of appropriate dimensions and be of suitable construction,
- (b) all steps should have the same rise,
- (c) all parallel steps should have the same going,
- (d) all tapered steps should have the same going.

Diagram 1 shows how to measure the rise and going of a step.

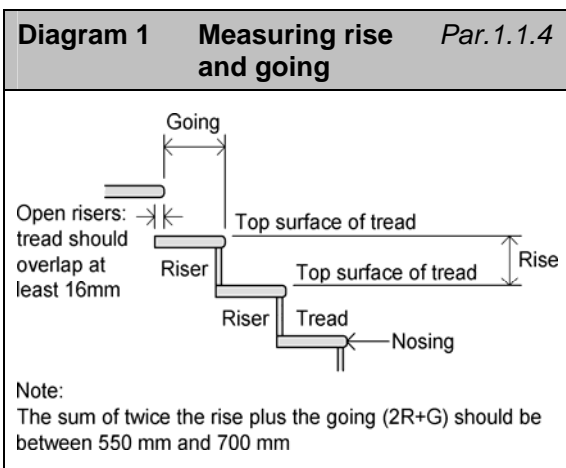


Table 1 contains recommendations on maximum rise, minimum going, maximum pitch, and optimum values in each case based on I.S. 158:1987 and BS 5395-1:2010.

<b>Table 1 Rise, going and pitch</b>		<i>Par. 1.1.4</i>				
Stairs	Rise (R) (mm)		Going (G) (mm)		Pitch (degrees) <sup>4</sup>	
	Optimum	Max.	Min.	Optimum	Optimum	Max.
Private <sup>1</sup>	175	220	220	250	35	42
Semi-public <sup>2</sup>	165	190	250	300	31	38
Public <sup>3</sup>	150	180	280	300	27	33

**Note:**

1. Private stairs means stairs used by a limited number of people who are generally very familiar with the stairs, e.g. the internal stairs in a dwelling.
2. Semi-public stairs means stairs used by larger numbers of people, some of whom may be unfamiliar with the stairs, e.g. in factories, offices, shops, common stairs serving more than one dwelling or apartment.
3. Public stairs means stairs used by large numbers of people at one time, e.g. in places of public assembly.
4. To ensure that the steps are suitably proportioned and comfortable to use, the rise and the going should be considered together. For comfortable gait the sum of twice the rise plus the going (2R+G) should be between 550 mm and 700 mm with an optimum of 600 mm.
5. For stairs, which are intended to satisfy the needs of ambulant disabled people see Technical Guidance Document M – Access and Use.

**1.1.5** Any series of three risers or less occurring at a change of level in a floor, balcony or roof and such like, need only comply with Table 1 and par. 1.1.4. The other provisions of this sub-section do not apply in such cases.

**1.1.6** The varying tread width of a tapered step can cause people to misjudge distances and can lead to falls. For this reason, the use of tapered steps should be avoided. If it is necessary to use them, they should preferably be situated at the bottom of the stairs.

Public stairs should not contain tapered steps.

Where consecutive treads are used, a uniform going should be maintained. For tapered treads, the going should conform with par. 1.1.4 when measured as follows:

- (a) if the flight is narrower than 1000 mm, measured in the middle, and
- (b) if the flight is 1000 mm or wider, measured 270 mm from each side.

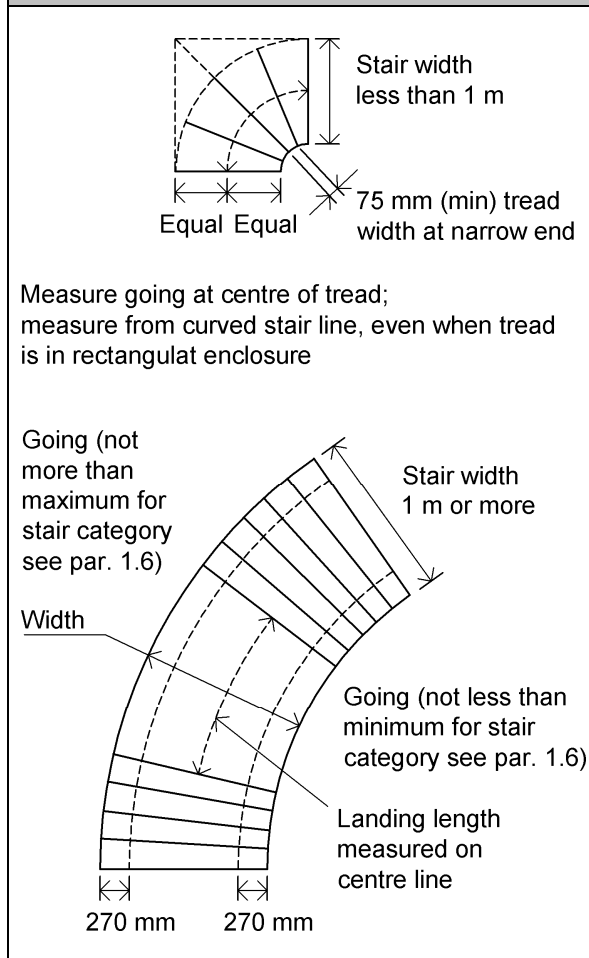
In addition, the going at the narrow end should be a minimum of 75 mm (see Diagram 2).

### Construction of steps

**1.1.7** Steps should have level treads. Steps may have open risers but in such cases the nosing of any tread should overlap, on plan, the back edge of the tread next below it by at least 16 mm (see Diagram 1). For steps suitable for ambulant disabled people refer to Technical guidance Document M – Access and Use.

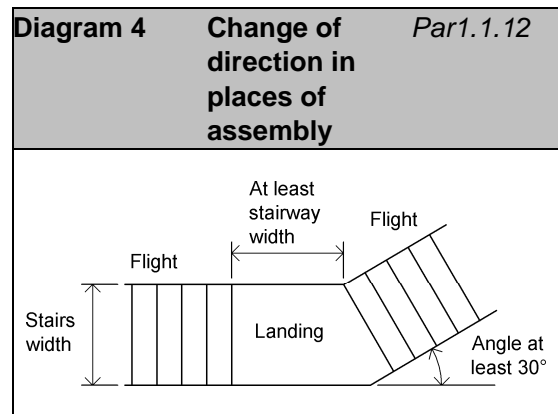
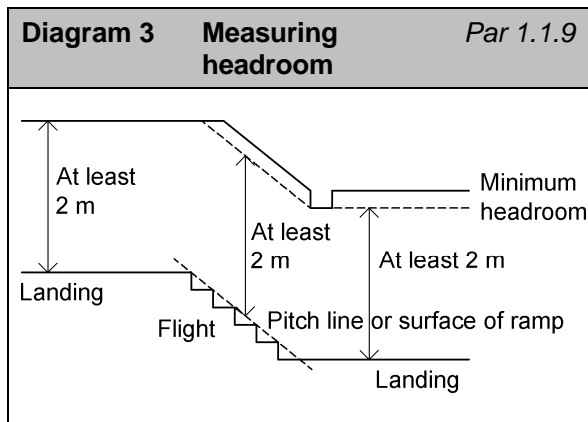
**1.1.8** A stairway with open risers should be constructed so that a 100 mm diameter sphere cannot pass through the opening between adjacent treads, unless the stairway is unlikely to be used by children under five years old.

**Diagram 2 Measuring tapered treads** *Par. 1.1.6*



### Headroom

**1.1.9** Headroom over the whole width of any stairs, measured as shown in Diagram 3, should generally be not less than 2 m. In the conversion of a loft where space is limited, headroom measured at the centre of the stairs should be not less than 1.9 m but may reduce to not less than 1.8 m at the side of the stairs if there is a minor projection.



### Widths of Stairs

**1.1.10** Private stairs should have a clear width of not less than 800 mm however; in certain circumstances they may need to be wider (See Technical Guidance Document M – Access and Use, Section 3.3.2.2).

In the case of semi-public and public stairways, designers should bear in mind the requirements for stairs which:

- (a) form part of a means of escape, reference should be made to Technical Guidance Document B – Fire Safety;
- (b) provide access suitable for ambulant disabled people, reference should be made to Technical Guidance Document M – Access and Use.

### Length of Flights

**1.1.11** There should not be more than sixteen risers in any one flight. A flight containing one or two risers in private stairs should be situated at the bottom of the stairs. For stairs suitable for use by ambulant disabled people, see guidance in Technical Guidance Document M – Access and Use.

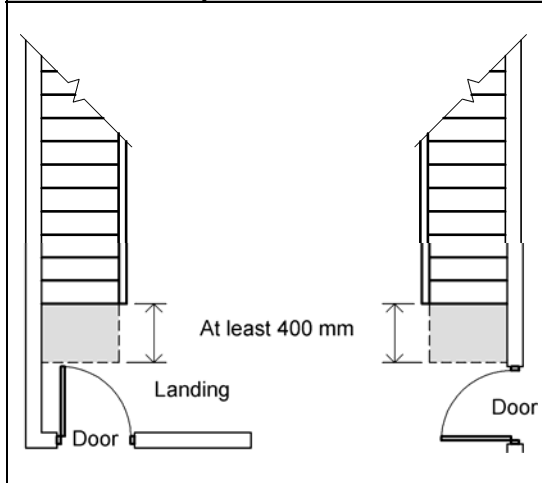
**1.1.12** In places of assembly to which large numbers of people have resort, there should be no more than two consecutive flights each having a maximum of twelve risers, without a change in direction of at least 30° between flights (see Diagram 4).

### Landings

**1.1.13** A level landing should be provided at the top and bottom of every flight except that a landing may not be necessary between a flight and a door if the total rise of the flight is not more than 600 mm and the door slides or opens away from the steps. The landing may include part of a floor. The width and going of the landing should be at least as great as the smallest width of the flight.

**1.1.14** Landings should be clear of permanent obstruction. A door opening on to a landing should be so positioned that there will be a clear space of at least the full width of the flight between the door swing and the flight. In the case of private stairs, the landing at the bottom of a flight may be reduced in length provided a clear space of at least 400mm is maintained between the flight and the door swing (see Diagram 5 for examples).

**Diagram 5 Landing next to door - private stairs** *Par. 1.1.14*



### Loft Conversions

**1.1.15** Spiral stairs with goings less than recommended in Table 2 of BS 5395 Part 2: 1984 and alternating tread stairs would not normally be regarded as acceptable. However, they may be considered in the conversion of a loft where space is limited i.e. where there is not enough space to accommodate stairs satisfying par. 1.1.1 to 1.1.14 above and the stairs serves only accommodation which will be used infrequently and, where the accommodation includes only one habitable room. Alternating tread stairs should be in straight flights, have handrails on both sides and the treads should have slip resistant surfaces. The goings and rises for the wider parts of the steps should comply with par. 1.1.4.

### Fixed Ladders

**1.1.16** A fixed ladder should have fixed handrails on both sides. It should not be used as the primary access to a habitable room.

### Handrails

**1.1.17** Stairs should have a handrail on at least one side if it is 1000 mm wide or less. It should have a handrail on both sides if it is wider. The top surface of the handrail should be between 900 mm and 1000 mm measured

vertically above the pitch line, and between 900 mm and 1100 mm above the landing, Handrails should give firm support. A handrail may form the top of the guarding if the height is suitable (refer to Diagram 6). The handrail should be so constructed and fitted as to be capable of being readily gripped by hand and safely used. Handrails may not be necessary beside the two bottom steps of private stairs.

### Guarding

**1.1.18** Stairs should be guarded at the sides (see Diagram 6), except where the total rise is no more than 600 mm, in which case guarding may not be essential. Suitable guarding would include a wall, screen (including glazing), railing or balustrade.

**1.1.19** Guarding should be designed and built in such a way that it does not present unacceptable risks of accidents in service. Where guarding contains glazing, it should be safety glazing in accordance with the recommendations of BS 6262-4: 2005. In buildings which are likely to be used by children under five years old, guarding should be so constructed that a 100 mm diameter sphere cannot pass through any openings in the guarding. Guarding should not be readily climbable and should be designed in such a way as to discourage young children from climbing it. Features in the guarding that might provide a foothold should be avoided e.g. horizontal rails.

Where a cut string is used, the triangular space formed by tread and riser is allowable, provided the bottom edge of the guarding is not more than 50 mm above the nosing line. The triangular space formed by the tread and riser is not allowable to stairs in dwellings and common stairs in blocks of flats.

**1.1.20** The appropriate heights and strength of guarding is set out in Diagram 6.

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## Further Guidance

**1.1.21** Further guidance on stairways and ladders is given in the following:-  
IS 158: 1987 Closed String Wood Stairs

BS 5395-1: 2010 Stairs, Part 1, Code of practice for the design of straight stairs and winders;

BS 5395-2: 1984 Stairs, ladders and walkways, Part 2 Code of practice for the design of helical and spiral stairs;

BS 5395-3: 1985 Stairs, ladders and walkways, Part 3 Code of practice for the design of industrial type stairs, permanent ladders and walkways;

BS 6180: 2011 Barriers in and about buildings, Code of practice;

I.S. EN 1991-1-1:2002 Eurocode 1: Actions on structures – Part 1-1: General actions – densities, self-weight, imposed loads for buildings (including Irish National Annex 2005)

I.S. EN 14975:2006+A1:2010 Loft ladders. Requirements, marking and testing.

## Sub-section 1.2

### Ramps

**1.2.1** A ramp should be so constructed that the slope does not exceed 1:20, except in the case of an individual flight the length of which is not greater than 10 m, when the slope may be greater. Under no circumstances should the slope exceed 1:12.

**1.2.2** Ramps and their landings should have clear headroom throughout of at least 2000 mm (see Diagram 3).

**1.2.3** A ramp should be clear of permanent obstructions. A door should not swing across the sloping part of any ramp.

**1.2.4** Ramps should have a clear width of not less than 800 mm. Further guidance on the width of ramps is provided in Technical Guidance Document B - Fire Safety and

Technical Guidance Document M – Access and Use.

**1.2.5** A ramp less than 1000 mm wide should have a handrail on at least one side. It should have a handrail on both sides if it is wider. Handrails should be at a height of between 900 mm and 1000 mm, measured vertically, and give firm support. A handrail may form the top of a guarding if the height is suitable. The handrail should be so constructed and fitted as to be capable of being readily gripped by hand and safely used.

For handrails on ramps providing access for people with disabilities refer to Technical Guidance Document M – Access and Use.

**1.2.6** A landing should be provided at the top and bottom of every ramp. Landings should be level, except where they are formed by the ground, in which case they may slope up to 1:50 provided that the ground is suitably paved. A landing may include part of a floor. The width and length of the landing should be at least as great as the smallest width of the ramp and doors should open away from landings. However, a door swing may encroach on landing space at the bottom of the ramp in a dwelling as described in par. 1.1.14.

**1.2.7** Ramps and their landings should be guarded at the sides in the same way as stairs (see pars. 1.1.18 to 1.1.20).

Diagram 6 Guarding design		Par. 1.1.20	
Building and location		Strength	Height (h)
Single family dwellings	Stairway, ramp, landing	Refer to I.S. EN 1991-1-1 <sup>1</sup>	900 mm for all elements
	Floor, balcony, roof		1100 mm
Factories and warehouses (light traffic)	Stairway, ramp	Refer to I.S. EN 1991-1-1 <sup>1</sup>	900 mm
	Landings and edges of floor		1100 mm
Other residential, institutional, educational, office and public buildings	All locations	Refer to I.S. EN 1991-1-1 <sup>1</sup>	900 mm for flights, elsewhere 1100 mm
Place of assembly	Within 530 mm in front of fixed seating	Refer to I.S. EN 1991-1-1 <sup>1</sup>	800 mm (h1)
	All other locations		900 mm for flights, elsewhere 1100 mm (h2)
Retail shop	All locations	Refer to I.S. EN 1991-1-1 <sup>1</sup>	900 mm for flights, elsewhere 1100 mm

**Note:**

1. together with the Irish National Annex (taking into account the recommendations of NA.4, as necessary)

# Section 2

## Pedestrian and Vehicle Barriers

Protection from falling.	K2	In a building the sides of every floor, balcony and every part of a roof to which people normally have access, and sunken areas connected to a building, shall be guarded to protect users from the risk of falling.
Vehicle ramps, floors and roofs	K3	In a building, the sides of every vehicle ramp and every floor and roof to which vehicles have access shall be guarded against the risk of vehicles falling therefrom.

### Introduction

**2.1** Paragraphs 2.2 to 2.9 give some guidance on good practice insofar as it relates to non-complex buildings of normal design and construction.

### Pedestrian Guarding

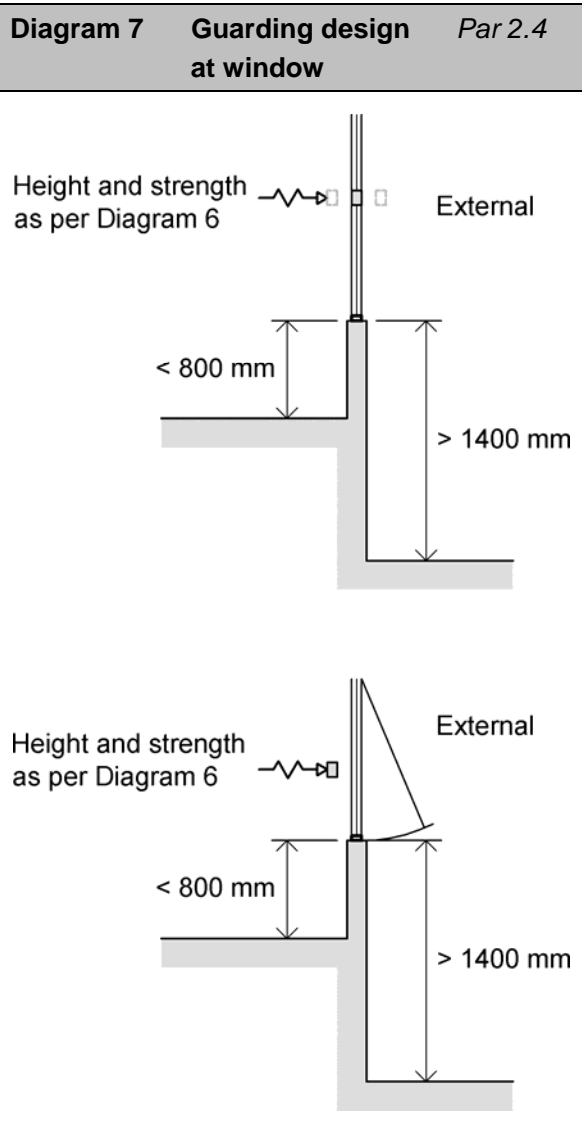
**2.2** Guarding should be provided to the sides of any part of a raised floor, gallery, balcony, roof or any other place to which people have access (unless access is only for the purpose of maintenance or repair). Guarding should also be provided to the sides of raised floors of vehicle parks in buildings, ramps used for vehicle access, sunken areas connected to buildings and any similar area where it is necessary for the safety of persons in or about a building. Guarding may not be essential where the total difference in levels is 600 mm or less.

Guarding need not be provided to places such as a loading bay or a stage where it would be incompatible with normal use.

**2.3** Suitable guarding would include a wall, screen (including glazing), railing, parapet or balustrade. Guarding should be at least the height shown in Diagram 6 and should be capable of resisting the force given in I.S. EN 1991-1-1 together with the Irish National Annex (taking into account the recommendations of NA.4, as necessary), and applied at the height shown.

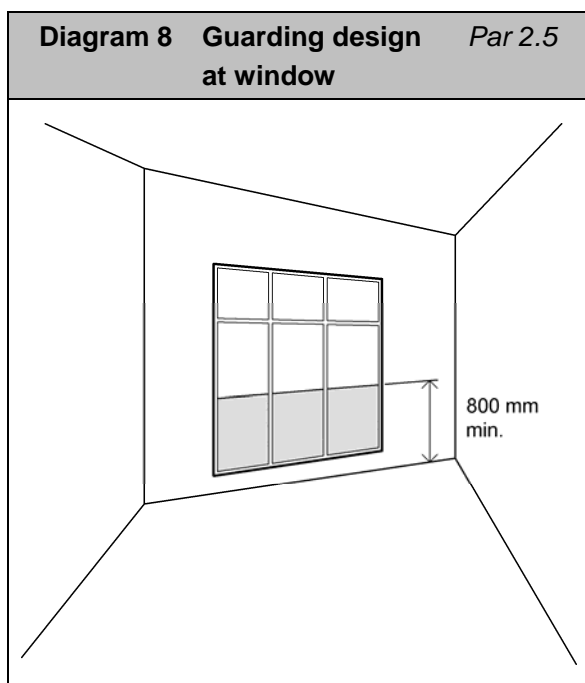
**2.4** Guarding should be provided for any window, the sill of which is more than 1400 mm above external ground level and is less than 800 mm in height above internal floor level (see Diagram 7).

Where a window is capable of being opened, special care must be taken to ensure that the guarding must remain in place and effective at all times.





**2.5** Guarding should be designed and built in such a way that it does not present unacceptable risks of accidents in service. Where guarding contains glazing, it should be in accordance with the recommendations of BS 6262 - 4: 2005 Glazing for Buildings - Part 4: Code of practice for safety related to human impact (see Diagram 8).



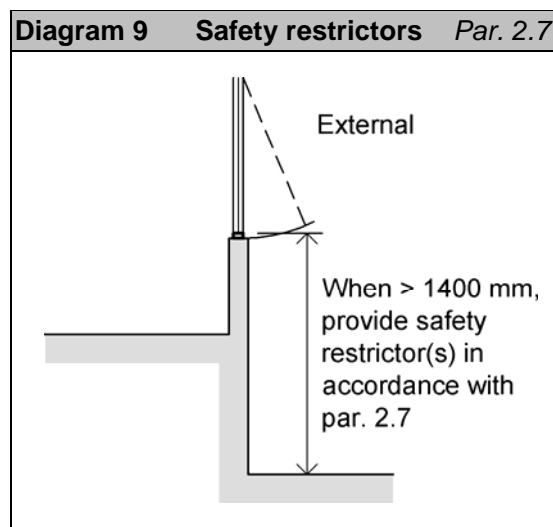
**2.6** In buildings which are likely to be used by children under five years old, guarding should be so constructed that a 100 mm diameter sphere cannot pass through any openings in the guarding. Guarding should not be readily climbable and should be designed in such a way as to discourage young children from climbing it. Features in the guarding that might provide a foothold should be avoided e.g. horizontal rails etc.

#### Prevention of falls from windows

**2.7** In dwellings where a window has an opening section through which a person may fall, (having particular regard to children under five years old), and is more than 1400 mm above external ground level, suitable safety restrictors should be provided (see Diagram 9).

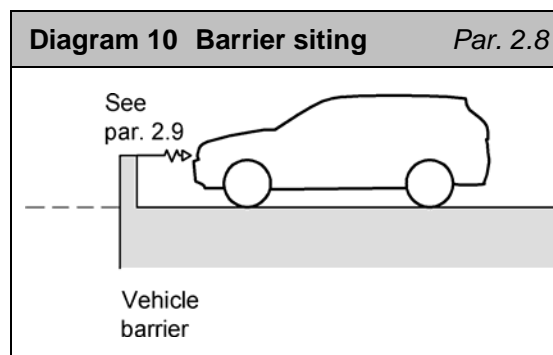
Safety restrictors should restrain the window sufficiently to prevent such falls. Restrictors can be either an integral part of the window operating gear or separate items of hardware which can be fitted to a window at the time of manufacture or at installation. Restrictors should operate so that they limit the initial movement of an opening section to not more than 100 mm.

**Note:** Lockable handles or restrictors, which can only be released by removable keys or other tools, should not be fitted to window opening sections required for escape purposes (see TGD B Fire Safety).



#### Vehicle barriers

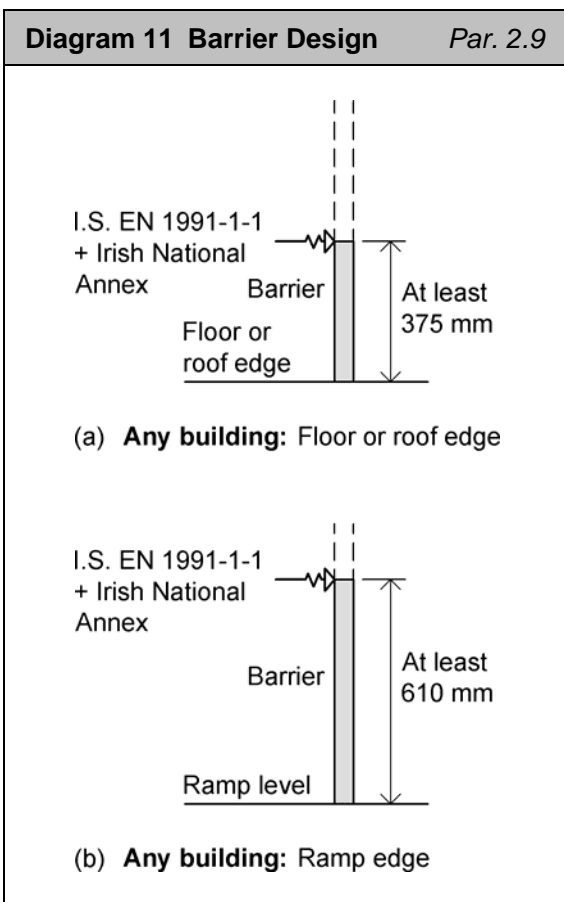
**2.8** If vehicles have access to a floor, roof or ramp which forms part of a building, barriers should be provided to any edges which are level with or above the floor or ground or any other route for vehicles (see Diagram 10).



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**2.9** Any wall, parapet, balustrade or similar obstruction may serve as a barrier. Barriers should be at least the height shown in Diagram 11.

Barriers should be capable of resisting the forces given in I.S. EN 1991-1-1 together with the Irish National Annex (taking into account the recommendations of NA.4, as necessary).



# Standards and publications

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I.S. 158: 1987 Closed String Wood Stairs

BS 5395-1: 2010 Stairs Code of practice for the design, of straight stairs and winders

BS 5395-2: 1984 Stairs, ladders and walkways, Part 2 Code of practice for the design of helical and spiral stairs AMD 6076, Corrigenda C2 + C3 2009

BS 5395-3: 1985 Stairs, ladders and walkways, Part 3 Code of practice for the design of industrial type stairs, permanent ladders and walkways AMD 14247

BS 6180: 2011 Barriers in and about buildings, Code of practice.

BS 6262 – 4: 2005 Glazing for Buildings - Part 4: Code of practice for safety related to human impact

I.S. EN 1991-1-1:2002 Eurocode 1: Actions on structures – Part 1-1: General actions – densities, self-weight, imposed loads for buildings (including Irish National Annex 2005)

I.S. EN 14975:2006+A1:2010 Loft ladders. Requirements, marking and testing

# Other standards and publications

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Supplementary guidance on the design of stairs to help achieve compliance with the Building Regulations – Department of the Environment, Community and Local Government (2014)

C722 Safer stairs in public places - assessment of existing stairs - CIRIA (2013)

Refurbishing stairs in dwellings to reduce the risk of falls and injuries – BRE TRUST (2013)

