



# **Building Regulations, 1991**

---

## **TECHNICAL GUIDANCE DOCUMENT K STAIRWAYS, RAMPS AND GUARDS**

---



DUBLIN:  
PUBLISHED BY THE STATIONERY OFFICE.

To be purchased through any Bookseller, or directly from the  
GOVERNMENT PUBLICATIONS SALE OFFICE  
SUN ALLIANCE HOUSE, MOLESWORTH STREET, DUBLIN 2.

Price £0.80p

DECEMBER, 1991

© Government of Ireland

# Contents

---

	Page
<b>Introduction</b>	<b>1</b>
Technical Specifications	
Materials and Workmanship	
Part K : The Requirement	2
 <b>Section 1</b>	
<b>STAIRWAYS AND RAMPS</b>	<b>3</b>
Introduction	
 <b>Sub-section 1.1</b>	
<b>Stairways and ladders</b>	
Guidance	
Rise, going and pitch	4
Construction of steps	5
Headroom	
Widths of stairways	
Length of flights	
Landings	6
Loft conversions	
Fixed ladders	
Handrails	
Guarding	
 <b>Sub-section 1.2</b>	
<b>Ramps</b>	<b>7</b>
 <b>Section 2</b>	
<b>PEDESTRIAN AND VEHICLE</b>	
<b>BARRIERS</b>	<b>8</b>
Guidance	
Pedestrian guarding	
Vehicle barriers	9
 <b>STANDARDS AND OTHER</b>	
<b>REFERENCES</b>	<b>10</b>



# BUILDING REGULATIONS, 1991

---

## TECHNICAL GUIDANCE DOCUMENT K STAIRWAYS, RAMPS AND GUARDS

---

### INTRODUCTION

This document has been published by the Minister for the Environment under article 5 of the Building Regulations, 1991, for the purpose of providing guidance with regard to compliance with the requirements of Part K of the First Schedule to the Regulations. Where works are carried out in accordance with this guidance, this will, *prima facie*, indicate compliance with these requirements.

This document should be read in conjunction with the Regulations.

Guidance contained in this document with respect to the use of a particular material, method of construction, standard or other specification does not preclude the use of any other suitable material, method of construction, standard or specification.

### TECHNICAL SPECIFICATIONS

Building Regulations are made for specific purposes i.e. health, safety and welfare of persons, energy conservation and the special needs of disabled people. Technical Specifications (including Harmonised European Standards, European Technical Approvals, National Standards and Agrément Certificates) are relevant to the extent that they relate to these considerations. Technical Specifications may also address other aspects of performance not covered by the Regulations.

The references in this document to named Technical Specifications, or to materials and methods which are likely to be suitable for the purposes of the Regulations, are not exclusive and other materials and methods may be suitable in particular circumstances. 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.

### MATERIALS AND WORKMANSHIP

Under Part D of the First Schedule to the Regulations, building work must be carried out with proper materials and in a workmanlike manner. Relevant guidance is contained in Technical Guidance Document D.

Part D of the First Schedule to the Regulations defines "proper materials" as materials which are fit for the use for which they are intended and for the conditions in which they are to be used, and includes materials which:

- (a) bear a CE Mark in accordance with the provisions of the Construction Products Directive (89/106/EEC); or
- (b) comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC); or
- (c) comply with an appropriate Irish Standard or Irish Agrément Board Certificate or with an alternative national technical specification of any Member State of the European Community, which provides in use an equivalent level of safety and suitability.

# STAIRWAYS, RAMPS AND GUARDS

---

## Building Regulations - The Requirement

---

Part K of the First Schedule to the Building Regulations, 1991 provides as follows:

<b>Stairways, ladders and ramps.</b>	<b>K1</b>	Stairways, ladders and ramps shall be such as to afford safe passage for the users of a building.
<b>Protection from falling.</b>	<b>K2</b>	In a building, the sides of every floor and balcony and every part of a roof to which people normally have access shall be guarded to protect users from the risk of falling therefrom.
<b>Vehicle ramps, floors and roofs.</b>	<b>K3</b>	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.
<b>Application of this Part.</b>	<b>K4</b>	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 2 sections.

Section 1 relates to the requirement in K1.

Section 2 relates to the requirements in K2 and K3.

# Section 1

## STAIRWAYS 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

The requirement in K1 does not apply to means of access outside a building unless they are part of the building, e.g. it would apply to entrance steps attached to a building but not to steps in site works leading up to the building.

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 disabled people (see Technical Guidance Document M).

This section of the Technical Guidance Document is divided into two sub-sections. Sub-section 1.1 deals with stairways and sub-section 1.2 deals with ramps.

#### Sub-section 1.1

#### Stairways and Ladders

#### GUIDANCE

**1.1.1 I.S. 158 : 1987 Closed String Wood Stairs** covers requirements for quality, design and construction of stairs in wood with closed strings for internal use in dwellings. It does not apply to stairs with open risers.

**BS 5395 : Part 1 1977 (1984) Code of practice for the design of straight stairs** deals with the design and construction of stairs in different materials for all types of buildings. It includes dimensional co-ordination, safety, means of escape, lighting, durability, constructional aspects, protection and painting, maintenance and cleaning, with illustrations and bibliography.

**BS 5395 : Part 2 : 1984 Code of practice for the design of helical and spiral stairs** covers materials, dimensions, fire protection, means of escape. It refers to BS 5395 : Part 1 for

dimensional coordination, safety measures, acoustics and lighting. Appendices cover geometry and load tests.

**BS 5395 : Part 3 : 1985 Code of practice for the design of industrial type stairs, permanent ladders and walkways** covers factors affecting choice of means of access or escape, structural materials, dimensions, safety equipment, platform and walkway floor loads. Refers to BS 5395 : Parts 1 and 2 for general design of stairs and to BS 6180 for general design of protective barriers.

**BS 6180 : 1982 Code of practice for protective barriers in and about buildings** gives advice on general design and construction of balustrades and protective barriers in and about buildings.

**BS 585 : Part 1 : 1989 Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter or half landings** includes plywood risers and treads, edge-to-edge jointed timber and glue-laminated wood components. It contains recommendations for fixing stairs on site and for the design of stairs with winder flights. Open risers, stairs wider than 1220 mm and flights having a total going exceeding 3800 mm are excluded.

**BS 585 : Part 2 : 1985 Specification for performance requirements for domestic stairs constructed of wood-based materials** covers straight flight stairs and stairs with quarter and half landings intended primarily for use inside one-family dwellings.

**BS 4211 : 1987 Specification for ladders for permanent access to chimneys, other high structures, silos and bins** covers Class A steel ladders, for permanent attachment to chimneys and other structures and Class B ladders for permanent attachment to silos, bins and agricultural plant, which may be formed of steel or aluminium.



The following paragraphs (1.1.2 to 1.1.20) give some guidance to good practice insofar as it relates to non-complex buildings of normal design and construction.

#### 1.1.2 In this sub-section -

**"flight"** is a part of a stairway which consists of a step or consecutive steps;

**"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;

**"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 within the width of a stairway.

## RISE, GOING AND PITCH

### 1.1.3 In any stairway -

- all of the steps should have the same rise and the same going and be of suitable construction,
- the rise of every step and the going of every step and landing should be of suitable dimensions, and
- the pitch of every flight should be appropriate.

1.1.4 **Diagram 1** shows how to measure the rise and going of a step. **Table 1** contains recommendations on maximum rise, minimum going and maximum pitch, and optimum values in each case based on I.S. 158 : 1987 and BS 5395 : 1977.

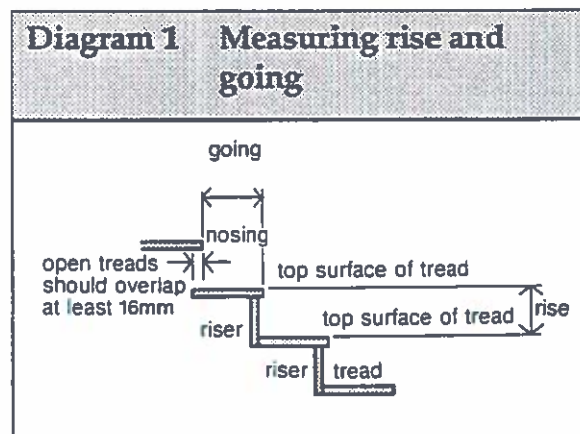


Table 1 Rise, going and pitch						
Stairway	Rise (mm)		Going (mm)		Pitch (degrees)	
	optimum	maximum	optimum	minimum	optimum	maximum
Private	175	220	250	220	35	42
Semi-Public	165	190	275	250	31	38
Public	150	180	300	280	27	33

#### Note

Private stairway means a stairway used by a limited number of people who are generally very familiar with the stairway, e.g., the internal stairway in a dwelling.

Semi-public stairway means a stairway used by larger numbers of people, some of whom may be unfamiliar with the stairway, e.g., in factories, offices, shops, common stairway serving more than one dwelling.

Public stairway means a stairway used by large numbers of people at one time, e.g. in places of public assembly and includes a stairway used by people with ambulatory difficulties, e.g., in hospitals, children's homes.



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.

1.1.5 For tapered treads, the going should conform with paragraphs 1.1.3 and 1.1.4 when measured as follows -

- (a) if the flight is narrower than 900 mm, measure in the middle, and
- (b) if the flight is 900 mm or wider, measure 270 mm from each side.

In addition, the going should measure at least 75 mm at the narrow end. Where consecutive tapered treads are used, a uniform going and rise should be maintained.

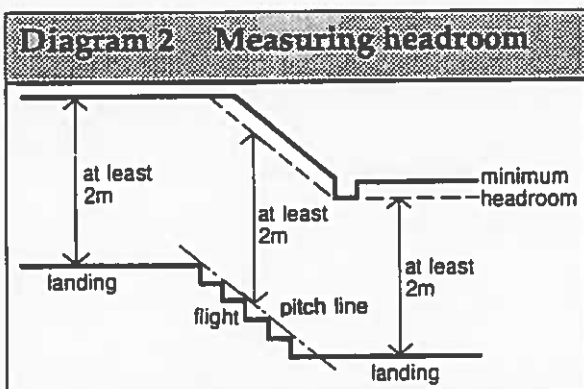
## CONSTRUCTION OF STEPS

1.1.6 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.

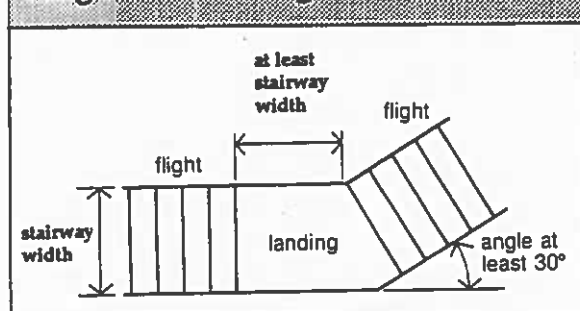
1.1.7 Stairways which have open risers should be constructed so that a 100 mm diameter sphere cannot pass through the opening between adjacent treads.

## HEADROOM

1.1.8 Headroom over the whole width of any stairway, measured as shown in Diagram 2, 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 stairway if there is a minor projection.



**Diagram 3 Change of direction**



## WIDTHS OF STAIRWAYS

1.1.9 BS 5395 : 1977 recommends 800 mm as the minimum unobstructed width for a private stairway and 1000 mm for semi-public and public stairways. It also recommends that a stairway which is more than 1800 mm in width should be divided by handrails into sections of not less than 1100 mm and not more than 1800 mm wide. See Technical Guidance Document B for requirements for stairways which form part of means of escape and Technical Guidance Document M for requirements for stairways providing access for disabled people.

## LENGTH OF FLIGHTS

1.1.10 There should be not fewer than three and not more than 16 risers in any one flight, except that, between the external door of a building and the ground or an access balcony, and at the foot of a stairway serving a single dwelling, one or two risers may be permitted.

1.1.11 In places of assembly to which large numbers of people have resort, there should be no more than two consecutive flights without a change in direction of at least  $30^\circ$  between flights. If there are more than 12 steps in a flight, there should be not more than one flight without a change in direction of at least  $30^\circ$ . (See Diagram 3).

## LANDINGS

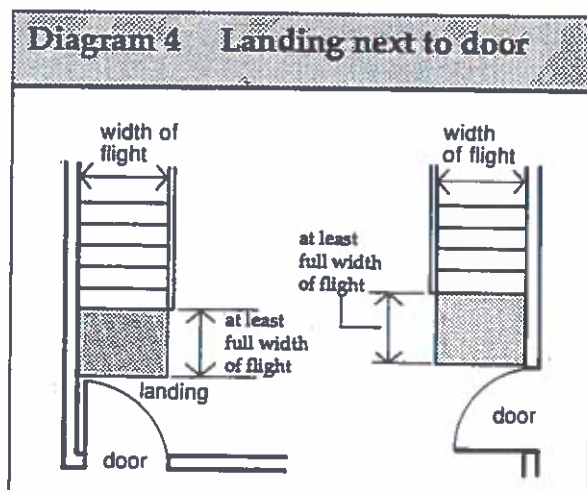
1.1.12 A landing should be provided at the top and bottom of every flight except that a landing may not be necessary between a flight and a door if the total rise of the flight is not more than 600 mm and the door slides or opens away from the steps. The landing may include part of a floor. The width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

1.1.13 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 (see Diagram 4 for examples).

1.1.14 Landings should be level except that, where they are formed by the ground, they may slope up to 1 : 50 provided the ground is paved and textured.

## LOFT CONVERSIONS

1.1.15 Spiral stairways with goings less than shown in BS 5395 Part 2 : 1984 and alternating tread stairways would not normally be regarded as acceptable. However, they may be considered in the conversion of a loft where space is limited and the stairway serves only accommodation which will be used infrequently and where the accommodation includes not more than one habitable room. Alternating tread stairways should 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 conform with paragraphs 1.1.3 and 1.1.4.



## FIXED LADDERS

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

## HANDRAILS

1.1.17 A stairway should have a handrail on at least one side if it is less than 1000 mm wide. It should have a handrail on both sides if it is wider. Handrails may not be necessary beside the two bottom steps of a stairway. Handrails should be at a height of between 840 mm and 1000 mm, measured vertically above the pitch line, and give firm support. A handrail may form the top of the 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. Stairways which will habitually be used by elderly or physically disabled people should ideally have handrails on both sides of the stairs not more than 900 mm apart so that both handrails may be gripped at the same time.

## GUARDING

1.1.18 Stairways should be guarded at the sides except that where the total rise of any flight is no more than 600 mm guarding may not be essential. Suitable guarding would include a wall, screen, 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. Guarding should be so constructed that a 100 mm diameter sphere cannot pass through any openings in the guarding and that it will not be readily climbable by children.

1.1.20 The heights of guardings recommended in BS 5395 : 1977 are set out in Table 2. The guarding should be able to resist a horizontal force, at the height given in Table 2, of 0.36 kN for each metre of length if it guards a private stairway, or, 0.74 kN if it guards any other stairway. (see Diagram 5).

Table 2 Height of guarding			
		Height (mm)	
1	private stairways	flights	840 mm
		landings	900 mm
2	other stairways	flights	900 mm
		landings	1100 mm

## 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 a ramp the length of which is not greater than 9 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 2 m (see Diagram 2 in sub-section 1.1).

1.2.3 See Technical Guidance Document B for requirements for ramps which form part of means of escape and Technical Guidance Document M for requirements for ramps providing access for disabled people.

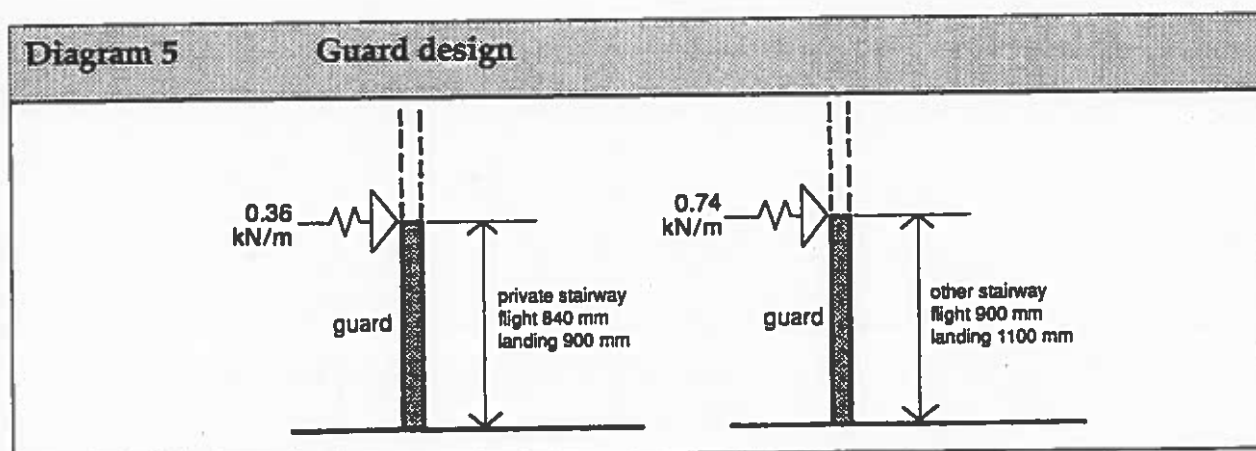
1.2.4 A ramp should be clear of permanent obstructions. A door should not swing across the sloping part of any ramp.

1.2.5 A ramp should have a handrail on at least one side if it is less than 1 m wide. It should have a handrail on both sides if it is wider. Handrails should be at a height of between 840 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. Ramps which will be habitually used by elderly or physically disabled people should ideally have handrails on both sides not more than 900 mm apart, so that both handrails may be gripped at the same time.

1.2.6 A landing should be provided at the top and bottom of every ramp. Landings should be level except that where they are formed by the ground 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. A door opening onto a landing should be so positioned that there will be a clear space of at least the full width of the ramp between the door swing and the sloping part of the ramp.

1.2.7 Where ramps and stairways are combined to form stepped ramps, the length of the ramps between flights should be between 900 mm and 2.1 m.

1.2.8 Ramps and their landings should be guarded at the sides in the same way as stairways.



## Section 2

# PEDESTRIAN AND VEHICLE BARRIERS

Protection from falling	K2	In a building, the sides of every floor and balcony and every part of a roof to which people normally have access shall be guarded to protect users from the risk of falling therefrom.
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.

### GUIDANCE

2.1 BS 6180 : 1982 Code of practice for protective barriers in and about buildings gives advice on general design and construction of balustrades and protective barriers in and about buildings.

The following paragraphs (2.2 to 2.8) give some guidance to 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 next to buildings and any similar area where it is necessary for

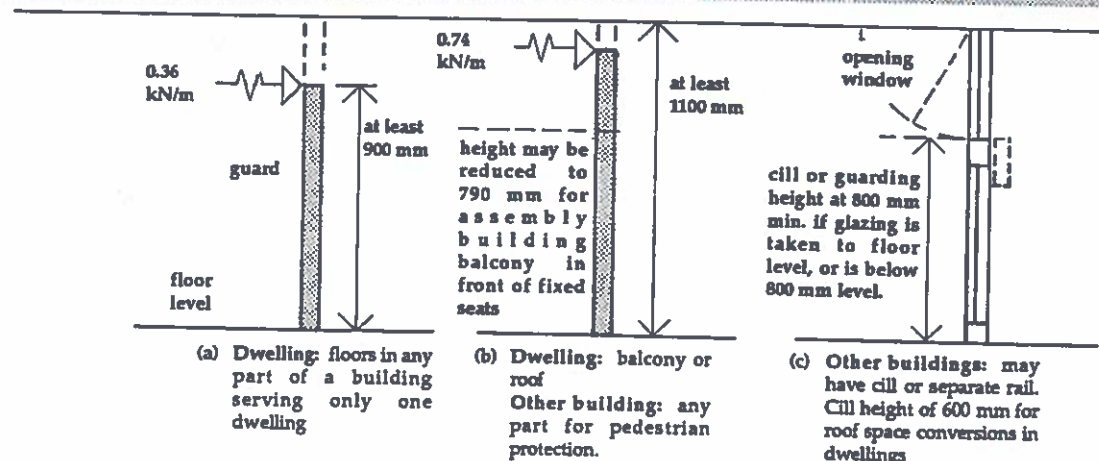
the safety of persons in or about a building. Guarding may not be essential where the total difference in levels is 600 mm or less. Guarding need not be provided to places such as a loading bay or a stage where it would be incompatible with normal use.

2.3 Suitable guarding would include a wall, screen, railing, parapet or balustrade. Guarding should be at least the height shown in Diagram 6 and should be capable of resisting the horizontal force given in Diagram 6 applied at the height shown. Appropriate precautions should be taken where the cill of a window is below the level at which guarding is required.

2.4 Guarding should be designed and built in such a way that it does not present unacceptable risks of accidents in service.

2.5 Guarding should be so constructed that a 100 mm diameter sphere cannot pass through any openings in the guarding and that it will not be readily climbable by children.

Diagram 6 Guard design





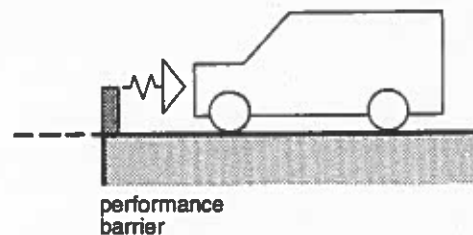
## VEHICLE BARRIERS

2.6 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 7).

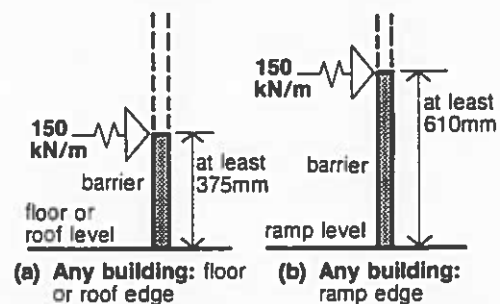
2.7 Any wall, parapet, balustrade or similar obstruction may serve as a barrier. Barriers should be at least the height shown in Diagram 8.

2.8 In a vehicle park which will not be used by vehicles of more than 2.5 tonnes and where the vehicles will not be moving at speeds of more than 16 km/h barriers should be capable of resisting a horizontal force of the values shown and at the height shown in Diagram 8. If the vehicle park will be used by heavier vehicles or by vehicles moving at a higher speed than 16 km/h, the relevant recommendations of BS 6180 : 1982 Code of practice for protective barriers in and about buildings, should be followed.

**Diagram 7 Barrier siting**



**Diagram 8 Barrier design**



# Standards and other references

---

**I.S. 158 : 1987 Closed String Wood Stairs.**

**I.S. 222P : 1980 Modular Dimensions for Stairs.**

**BS 585 Wood stairs Part 1 : 1989 Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter or half landings.**

**BS 585 Wood stairs Part 2 : 1985 Specification for performance requirements for domestic stairs constructed of wood-based materials.**

**BS 4211 : 1987 Specification for ladders for permanent access to chimneys, other high structures, silos and bins.**

**BS 5395 Stairs, ladders and walkways Part 1: 1977 (1984) Code of practice for design of straight stairs AMD 3355 AMD 4450.**

**BS 5395 Stairs, ladders and walkways Part 2: 1984 Code of practice for the design of helical and spiral stairs AMD 6076.**

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

**BS 5578 Building construction - stairs Part 2: 1978 (1988) Modular coordination : specification for coordinating dimensions for stairs and stair openings.**

**BS 5606 : 1990 Guide to accuracy in building.**

**BS 6180 : 1982 Code of practice for protective barriers in and about buildings AMD 4858.**

**BS 6954 Tolerances for building Part 1 : 1988 Recommendations for basic principles for evaluation and specification.**

**BS 6954 Tolerances for building Part 2 : 1988 Recommendations for statistical basis for predicting fit between components having a normal distribution of sizes.**

**BS 6954 Tolerances for building Part 3: 1988 Recommending target size and predicting fit.**





