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Building Regulations, 1997

Technical Guidance Document K

Stairways, Ladders, Ramps and Guards

Introduction

This document has been published by the Minister for the Environment 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, 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, 1998. Technical Guidance Document K - STAIRWAYS, RAMPS AND GUARDS, dated 1991, also ceases to have effect from that date. However, the latter document may continue to be used in the case of 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, before 1 January, 1998,
- in respect of which a Fire Safety Certificate under the Building Control Regulations, 1991 to 1994, has been granted, where the works or change of use commence or takes place, as the case may be, not later than 31 December, 2002.

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 disabled persons. 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. 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 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 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

Building Regulations - The Requirement

Part K of the Second Schedule to the Building Regulations, 1997, 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 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.
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.

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.
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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 disabled people (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 makes 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:

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

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.

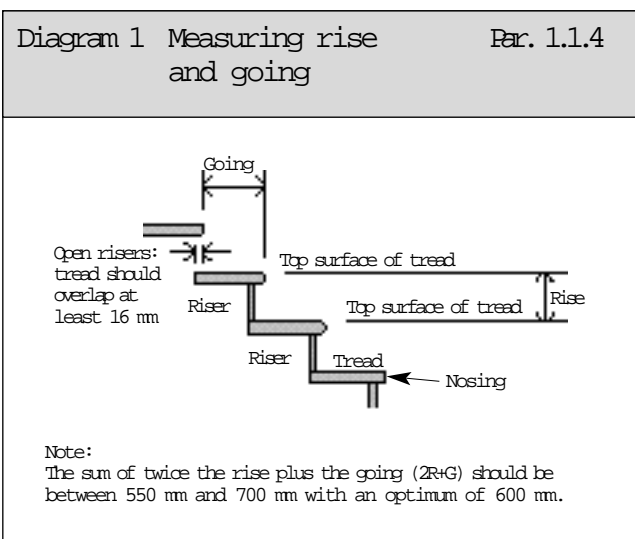
Diagram 1 shows how to measure the rise and going of a step.

Table 1 contains recommendations on maximum rise, minimum going and maximum pitch, and optimum values in each case based on I.S. 158 : 1987 and BS 5395 : 1977.

Stairs	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:

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.
3. Public stairs means stairs used by large numbers of people at one time, e.g. in places of public assembly.
4. In public and semi-public stairs, which are required to be accessible for disabled people (see Technical Guidance Document M), the rise should not be greater than 175 mm and the sum of twice the rise plus the going ($2R+G$) should be a minimum of 630 mm



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. The other provisions of this sub-section do not apply in such cases.

1.1.6 For tapered treads, the going should conform with par. 1.1.4 when measured as follows -

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

In addition, the going at the narrow end should be measured in accordance with the recommendations of I.S. 158 : 1987. Where consecutive tapered treads are used, a uniform going should be maintained.

Construction of Steps

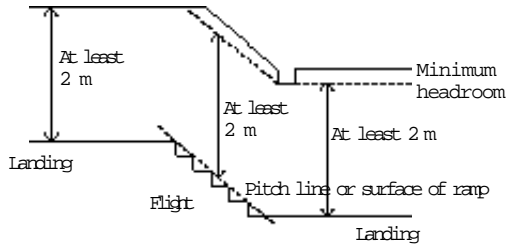
1.1.7 Steps should have level treads. Steps may have open risers but in such cases the nosing of any tread should overlap, on plan, the back edge of the tread next below it by at least 16 mm.

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

Headroom

1.1.9 Headroom over the whole width of any stairs, 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 stairs if there is a minor projection.

Diagram 2 Measuring headroom Par. 1.1.9



Widths of Stairs

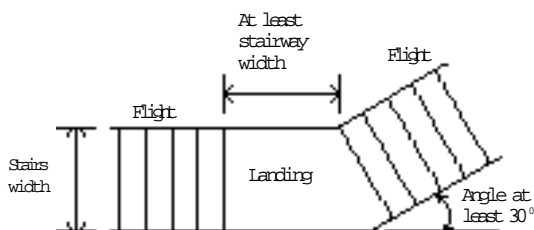
1.1.10 Private stairs should have a clear width of not less than 800 mm. In the case of semi-public and public stairways, the guidance contained in Technical Guidance Documents B - Fire Safety and M - Access for Disabled Persons applies.

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.

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 3).

Diagram 3 Change of direction Par. 1.1.12 in places of assembly

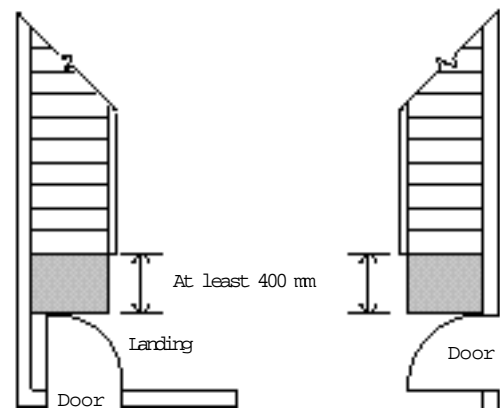


Landings

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 400 mm is maintained between the flight and the door swing (see Diagram 4 for examples).

Diagram 4 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 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 conform 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. Handrails should be at a height of between 840 mm and 900 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. Handrails may not be necessary beside the two bottom steps of private stairs.

Guarding

1.1.18 Stairs should be guarded at the sides, 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 in accordance with the recommendations of BS 6262 Part 4. In addition, unless the stairs are unlikely to be used by children under five years of age, 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. Where a cut string is used, the triangular space formed by tread and riser is allowable, provided the bottom edge of the balustrade is not more than 50 mm above the nosing line.

1.1.20 The heights of guarding are set out in Diagram 5.

Further Guidance

1.1.21 Further guidance on stairways and ladders is given in the following:-

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

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

BS 5395 : Part 1 1977 (1984) Code of practice for the design of straight stairs;

BS 5395 : Part 2 : 1984 Code of practice for the design of helical and spiral stairs;

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

BS 6180 : 1982 Code of practice for barriers in and about buildings;

BS 6399 : Loading for buildings : Part 1: 1984 Code of practice for dead and imposed loads;

BS 7553 : 1992 Specification for loft ladders.

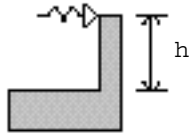
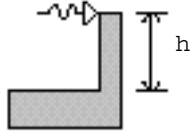
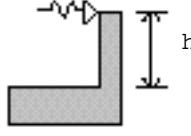
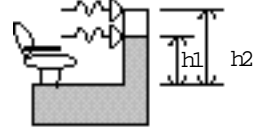
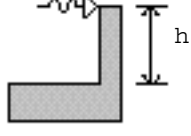
Sub-section 1.2

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 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).

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

Diagram 5		Guarding design		Par. 1.1.20
BUILDING AND LOCATION		STRENGTH	HEIGHT	
Single family dwellings	Stairway, ramp	Refer to BS 6399 Part 1	840 mm	
	Landing		900 mm	
	Floor, balcony, roof		1100 mm	
Factories & warehouses (light traffic)	Stairway, ramp	Refer to BS 6399 Part 1	900 mm	
	Landings and edges of floor		1100 mm	
Other residential, institutional, educational, office and public buildings	All locations	Refer to BS 6399 Part 1	900 mm for flights, elsewhere 1100 mm	
Place of assembly	530 mm in front of fixed seating	Refer to BS 6399 Part 1	800 mm (h1)	
	All other locations		900 mm for flights, elsewhere 1100 mm (h2)	
Retail shop	All locations	Refer to BS 6399 Part 1	900 mm for flights, elsewhere 1100 mm	

1.2.4 Private ramps should have a clear width of not less than 800 mm. In the case of semi-public and public ramps, the guidance contained in Technical Guidance Documents B - Fire Safety and M - Access for Disabled Persons applies.

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 840 mm and 900 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.

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).

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.

Introduction

2.1 BS 6180 : 1995 Code of practice for barriers in and about buildings, gives advice on general design and construction of balustrades and protective barriers in and about buildings.

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.

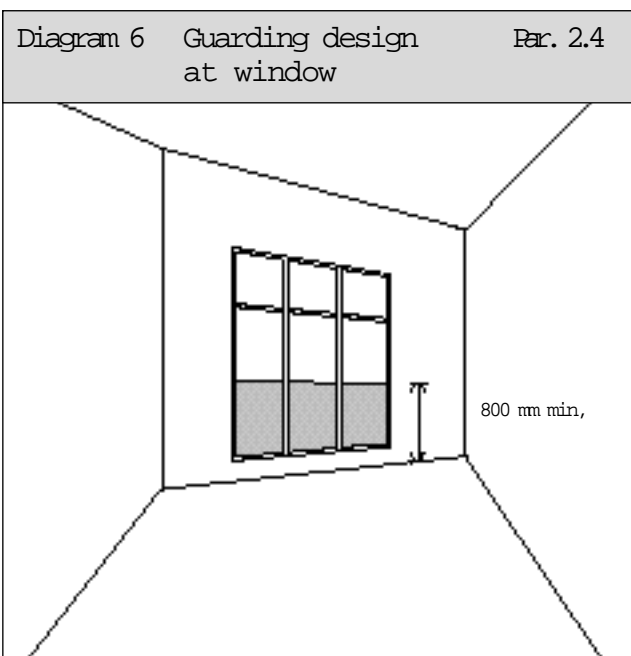
Pedestrian Guarding

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 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 (including glazing), railing, parapet or balustrade. Guarding should be at least the height shown in Diagram 5 and should be capable of resisting the horizontal force given in BS 6399: Part 1, applied at the height shown.

2.4 Guarding is required for any window the sill of which is less than 800 mm in height above floor level. Where the 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 (see Diagram 6).

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 : Part 4.



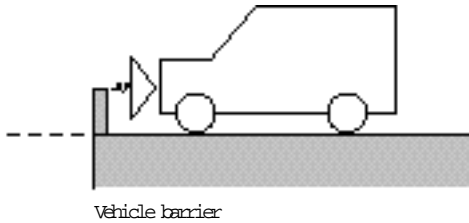
2.6 Unless the building is unlikely to be used by children under five years old, guarding should be so constructed that a 100 mm diameter sphere cannot pass through any openings in the guarding and that it will not be readily climbable.

Vehicle Barriers

2.7 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).

Diagram 7 Barrier siting

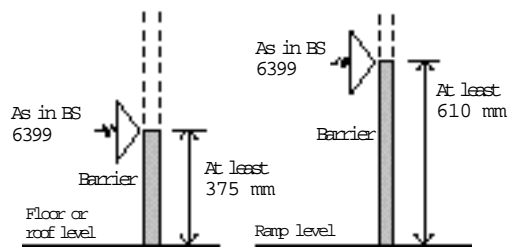
Par. 2.7



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

Diagram 8 Barrier design

Par. 2.8



(a) ANY BUILDING:
FLOOR OR ROOF EDGE

(b) ANY BUILDING:
RAMP EDGE

2.9 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 forces set out in BS 6399 Loading for buildings Part 1: 1984. 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 barriers in and about buildings, should be followed.

Standards and other references

I.S. 158 : 1987 Closed String Wood 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 AMD 6510

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

BS 4467 : 1991 Guide to dimensions in designing for elderly people

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 co-ordination : specification for co-ordinating dimensions for stairs and stair openings

BS 6180 : 1995 Code of practice for protective barriers in and about buildings

BS 6262 Glazing for buildings Part 4 : 1994 Code of practice for safety Human impact

BS 6399 : Loading for buildings: Part 1 : 1984 Code of practice for dead and imposed loads AMD 4949; AMD 5881; AMD 6031

BS 7553: 1992 Specification for loft ladders AMD 7417