



# Glass and Building Regulations

## *Stairs, Ramps and Barriers*

England and Wales  
Approved Document K

Scotland  
Part S

Northern Ireland  
Part H



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## Foreword

For new buildings and for buildings subject to major refurbishment, the requirements for glazing when incorporated in the designs of stairs, ramps and barriers can be found in three Building Regulation Documents.

### England and Wales

The Building Regulations 1991 Part K Stairs, Ramps and Guards. Approved Document K Stairs, Ramps and Guards 1992 Edition gives general guidance on the interpretation of the requirements.

### Scotland

The Building Standards (Scotland) Regulations 1990 Part S Stairs, Ramps and Protective Barriers.

The 1990 Technical Standards document provides guidance on the interpretation of the requirements.

### Northern Ireland

The Building Regulations Northern Ireland 1994, Part H Stairs, Ramps and Guarding.

Technical Booklet H Stairs, Ramps and Guarding 1994, provides guidance on the interpretation of the requirements.



*Horizontal Pilkington Pyrostop New Queen's Stand, Epsom Racecourse*

## Requirements

Each of the Regulations applying to different parts of the UK expresses the requirements in slightly different ways but all of them rely on BS 6180: 1982 'Code of practice for protective barriers in and around buildings' to provide more detailed design information. A revised version of BS 6180 was published in 1995.

The common aim of each of the Regulations is to set basic requirements aimed at protecting people from falling and in some circumstances to control movement.

The word barrier is used in the context of this document to describe features such as guards, balustrades and parapets.

The type of building and its intended use must be given careful consideration when the type of barrier is being determined. Generally when there is a change in adjacent levels (600mm in dwellings, 380mm in other buildings) a barrier is needed to restrict the movement of people or vehicles. (Glass is not a suitable material to use when protection for or from vehicles is required).

The design of the barrier should minimise the risk of people falling, sliding, rolling or slipping through gaps in the barrier.

Where children under 5 years are likely to be involved, the barrier should be designed so that the widest gap will prevent a sphere of 100mm passing through it. This is to prevent young children falling through.

Where multiple use of an area in or around a building is anticipated, barriers should be designed to meet the particular situations.

Barriers must be designed to minimum permissible heights and to withstand various forms of design load which are stipulated in each Building Regulation and in BS 6180: 1982.

The Horizontal UDL (uniformly distributed load) should be applied at a notional height of 1.1m above finished floor level, according to BS 6180: 1982

and 1995, even though the minimum permissible height of the barrier may be less. Apart from Scotland, Building Regulations suggest that the load should be applied at the actual barrier height which is quoted for the particular situation where guarding is required. The Building Standards (Scotland) Regulations 1990 Part S simply refer to BS 6180: 1982.

(The notional design height of 1.1m is chosen as being representative of the height of the centre of gravity of a human being above the datum level).

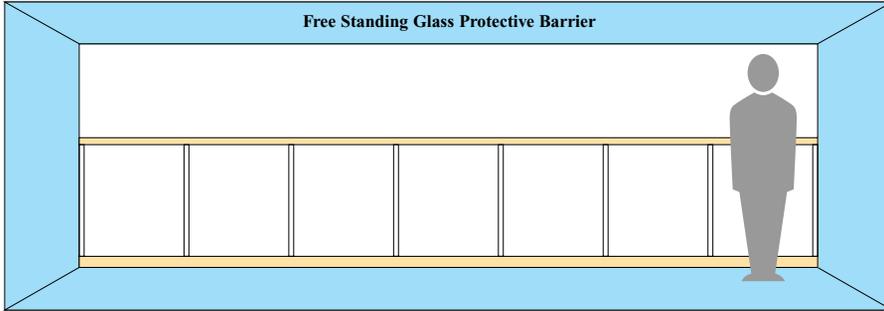
## Glass

Guidance for the choice of appropriate glass specifications for given loadings and support configurations is given in the *Pilkington Technical Bulletin 'Glass and Mechanical Strength'*.

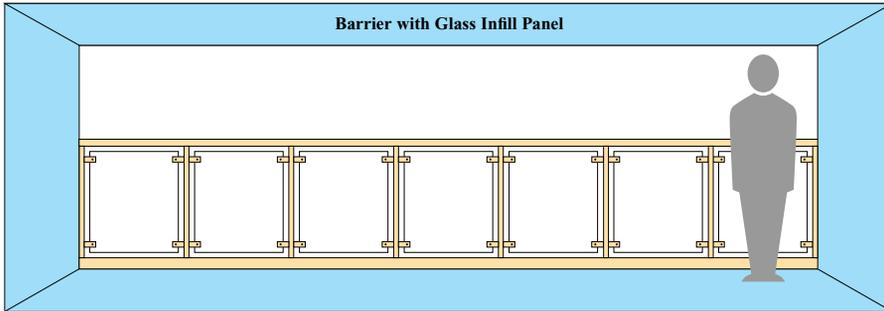


*Free standing glass protective barrier*

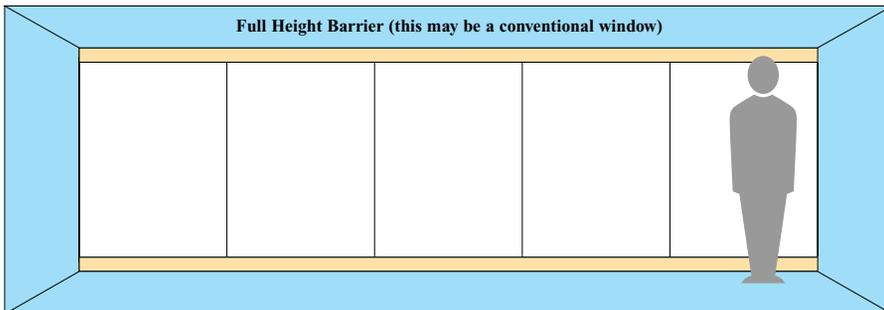
Free Standing Glass Protective Barrier



Barrier with Glass Infill Panel



Full Height Barrier (this may be a conventional window)



Free Standing Glass Protective Barrier requires four design loadings to be taken into account:

- Line load (Horizontal UDL)  $\text{kN/m}^2$
- UDL (Infill UDL)  $\text{kN/m}^2$
- Concentrated load  $\text{kN}$
- Impact Force BS 6206 Class A or C

Barrier with Glass Infill Panel requires three design loadings to be taken into account:

- UDL (Infill UDL)  $\text{kN/m}^2$
- Concentrated Load  $\text{kN}$
- Impact Force BS 6206 Class A or C

Full Height Barrier requires three design loadings to be taken into account:

- Line load (Horizontal UDL)  $\text{kN/m}^2$
- UDL (Infill UDL)  $\text{kN/m}^2$
- Concentrated load  $\text{kN}$

The design loadings which need to be taken into account will vary with the type of barrier.

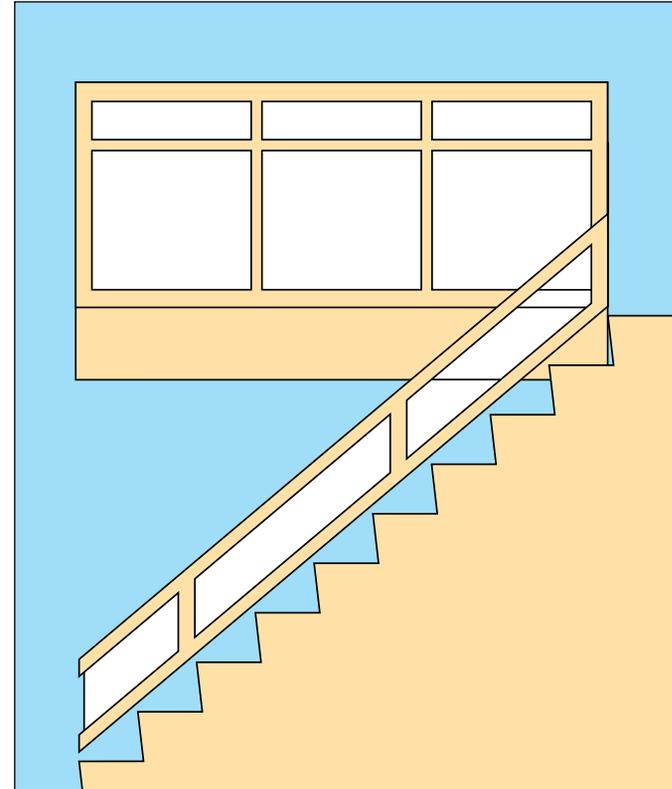
## England and Wales

When glazing is used as guarding for stairs, parapets or as balustrades it must be capable of withstanding the loadings and satisfy minimum height requirements given in Table 1 below. The glazing should also be designed with reference to Approved Document N Glazing – Materials and Protection.

Further guidance on the appropriate loads on infill panels can be obtained from BS 6180: 1982 ‘Code of practice for protective barriers in and around buildings’.

Guarding should be provided where it is necessary for safety reasons to guard the edges of any floor including window, gallery, balcony, roof (including rooflights) and other openings to which people have access (unless for maintenance) such as light walls, basement areas and any sunken area next to a building.

Where buildings are likely to be used by children under 5 years old, the guarding should be designed to prevent young children becoming trapped by the guarding. A 100mm diameter sphere must be unable to pass through any gap in the guarding. It must be designed so that children can not readily climb up it.



*Figure 1. Illustrates some typical locations where a barrier must provide containment*

Building Category and Location		Strength	Height (H)	
Single family dwelling	stairs, landings, ramps edges of internal floors	0.36kN/m	900mm for all elements	
	external balconies and edges of roof	0.74kN/m	1100mm	
Factories & warehouses (light traffic)	stairs, ramps	0.36kN/m	900mm	
	landings and edges of floor	0.36kN/m	1100mm	
Residential, institutional, educational, office and public buildings	all locations	0.74kN/m	900mm for flights otherwise 1100mm	
Assembly	within 530mm in front of fixed seating	1.5kN/m	800mm (H1)	
	all other locations	3.0kN/m	900mm for flights elsewhere 1100mm (H2)	
Retail	all locations	1.5kN/m	900mm for flights otherwise 1100mm	
All buildings	at opening windows		800mm	
	at glazing to changes of level	to provide containment	below 800mm	

An amendment to Part K, which come into effect in 1998, requires that “provision shall be made to ensure a clear view of the space either side of a swing door or gate”. The Approved Document indicates that such doors should have glazing in the zone 900-1500mm above floor level (figure 2)

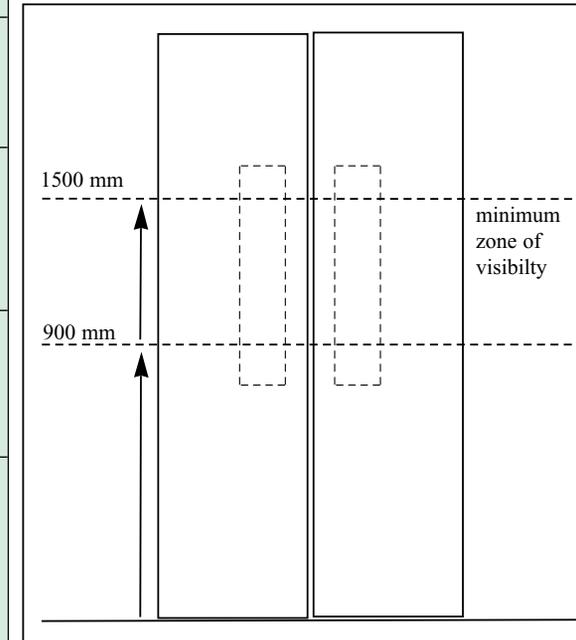


Figure 2. Requirement for vision panels in doors on main traffic routes and swing doors

Note. H is the height at which the applied load (horizontal design load) is located, it is not necessarily the height of the barrier itself.

## Scotland

Except where the provision of protective barriers would obstruct the use of the following areas, every stair, ramp, raised floor or other raised accessible area which forms part of a building should have protective barriers. In dwellings, other residential accommodation, and assembly and recreational buildings, openings in barriers and guards must be small enough to prevent a sphere of 100mm diameter passing through.

When glazing is used as a protective barrier, it must conform to the minimum barrier dimensions given in Table 2 below and must comply with the loadings given in BS 6180: 1982 'Code of Practice for protective barriers in and about buildings'.

**Table 2 – Minimum Barrier Dimensions**

Location	Minimum height (mm)
On a flight within or serving a single dwelling	840
On (a) any other flight and (b) on a landing to a stair or ramp within or serving a single dwelling	900
In front of fixed seating	790
Elsewhere	1100

## Northern Ireland

When glazing is used as guarding it must be capable of withstanding the loadings and satisfy the dimensional requirements given in Table 3 below.

\* Crowd loading will occur in parts of buildings such as theatres, discotheques, cinemas, sports halls, assembly halls, shopping malls and similar areas.

† In the case of a stair or ramp the height shall be measured from the line of the pitch or slope.

**Table 3 – Minimum height and strength of guarding**

Location of guarding (1)	Min. height† (mm) (2)	Min. horizontal force/metre run (kN/m) (3)
<b>1 Dwellings</b>		
(a) guarding a flight, ramp, landing or floor within a dwelling	900	0.36
(b) guarding not described in (a)	1100	0.74
<b>2 Retail buildings</b>		
(a) guarding a flight or ramp	900	1.5
(b) guarding not described in (a)	1100	1.5
<b>3 Other buildings</b>		
(a) guarding a flight, or ramp where crowd loading* will not occur	900	0.74
(b) guarding a flight or ramp where crowd loading* will occur	1100	0.74
(c) guarding not described in (b) where crowd loading* will occur	1100	3.0
(d) guarding a floor immediately in front of fixed seating	800	1.5
(e) guarding not described in (a) to (d) 1100	1100	0.74

## Infill Panels

Where infill panels are provided they must be designed and constructed in accordance with the relevant parts of BS 6180: 1982 'Code of practice for protective barriers in and around buildings'.

Where the building or part of a building is likely to be used by children under 5 years old, the guarding must be constructed so that a sphere of 100mm in diameter cannot pass through any opening in it, other than a triangular opening formed by a tread, a rise and the bottom edge of the guarding if that bottom edge is not more than 50mm above the pitch line. It must not be easy for a child to climb up it.

## Guarding at Openable Windows

Where the difference in level between the floor and the ground outside the openable window is more than 2m, guarding with a minimum height of 800mm must be provided.

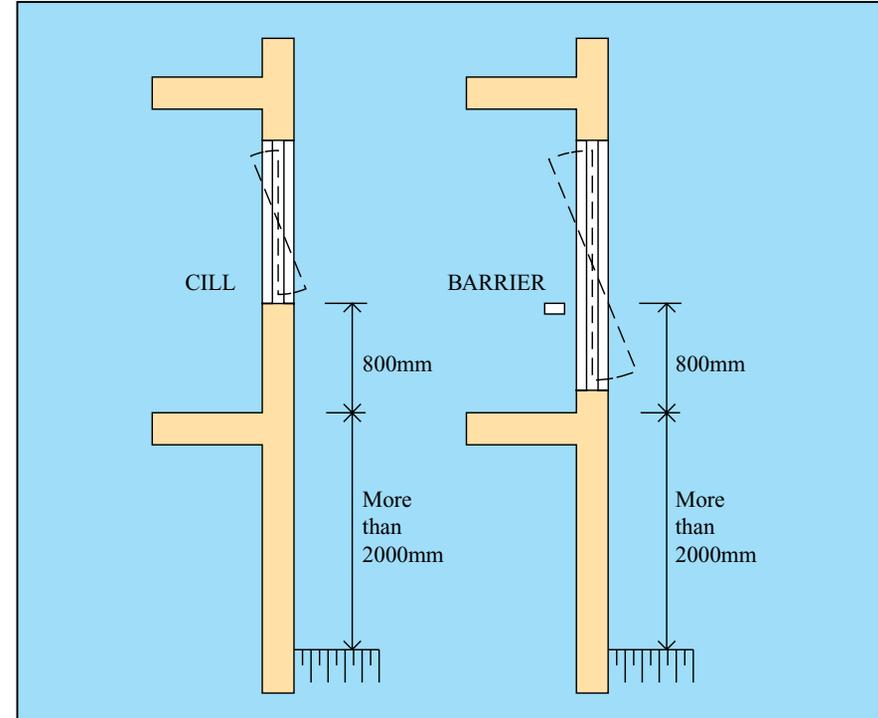


Figure 3. Guarding at openable windows

## Guarding to Low Level Glazing

When the difference in level between the floor and the ground outside the glazing is more than 2m, the glazing below 800mm must act as guarding except where separate guarding is provided.

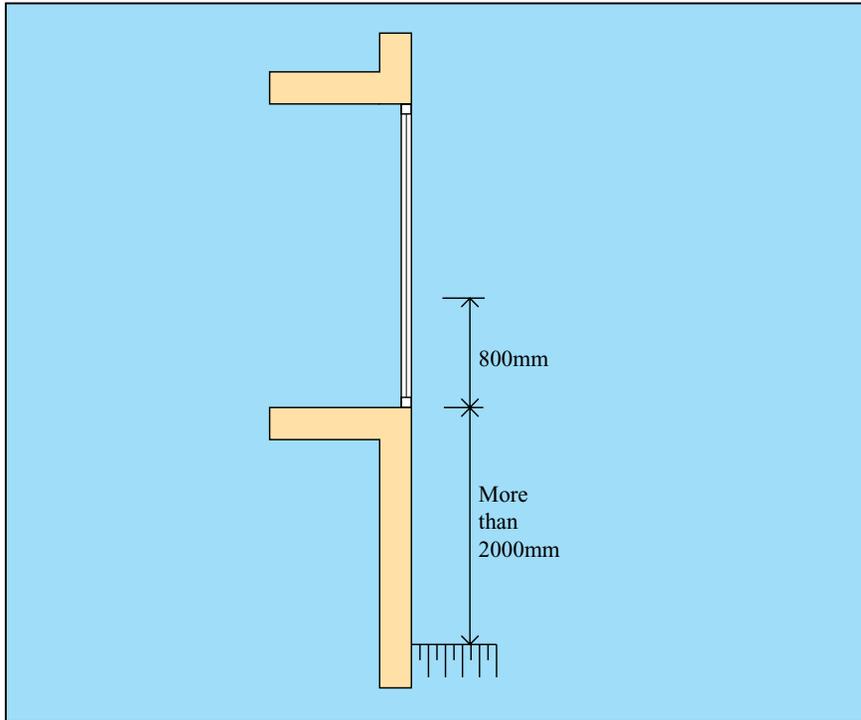


Figure 4. Guarding to low level glazing

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