BRITISH STANDARD

BS EN
13200-3:2005

Spectator facilities —

Part 3: Separating elements — Requirements

The European Standard EN 13200-3:2005 has the status of a British Standard

ICS 91.040.10; 97.200.10; 97.220.10

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13200-3:2005.

The UK participation in its preparation was entrusted to Technical Committee B/552, Spectator facilities, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Spectator facilities - Part 3: Separating elements - Requirements

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Zuschaueranlagen - Teil 3: Abschrankungen - Anforderungen

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Foreword

This European Standard (EN 13200-3:2005) has been prepared by Technical Committee CEN/TC 315 “Spectator facilities”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard has been prepared in order to specify the general design criteria for spectator facilities (permanent, movable, demountable and telescopic), with the purpose of enabling their functionality.

Within this European Standard minimum and recommended values for dimensions and loadings are occasionally presented. It should be recognised that these values are to be considered as values that in part recognise different national requirements as a basic provision.

Attention is drawn to the fact that in certain countries additional/different requirements may be applicable due to existing national regulations or equivalent.

This European Standard is divided among six parts:

EN 13200-1, *Spectator facilities - Part 1: Layout criteria for spectator viewing area - Specification*

prCEN/TR 13200-2, *Spectator facilities - Layout criteria of service area –Part 2: Characteristics and national situations*

EN 13200-3, *Spectator facilities - Part 3: Separating elements - Requirements*

prEN 13200-4 *Spectator facilities - Part 4: Seats - product characteristics*

prEN 13200-5 *Spectator facilities - Part 5: Telescopic stands*

prEN 13200-6, *Spectator facilities – Part 6: Demountable (temporary) stands*

IMPORTANT NOTES

NOTE 1 The proposed values for barrier loadings contained in Tables A1, A2 and A3 may be justified from experimentally determined values appropriate to the barrier provision.

NOTE 2 Separating elements for demountable and retractable stands are included within this European Standard.

NOTE 3 Safety management does not form part of this European Standard.

1 Scope

This European Standard specifies design requirements for layout and product characteristics for separating elements within spectator accommodation at permanent or temporary entertainment venues including sport stadia, sport halls, indoor and outdoor facilities for the purpose of enabling their functionality.

Other permanent venues such as theatres, cinemas, opera houses, lecture halls and similar are excluded from this standard.

Elements and barriers included in this standard are:

a) external perimeter barriers (5.2)

b) activity area barriers (5.3)

c) segregation elements (5.4)

d) crush barriers (5.5)

e) barriers in front of and behind seating (5.6)

f) barriers in spectator galleries (5.7)

g) ingress and turnstiles (5.8)

h) exit doors and gates (see 5.9)

i) temporary barriers (5.10)

j) front of stage barriers (5.11)

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13200-1:2003, *Spectator facilities - Part 1: Layout criteria for spectator viewing area - Specification*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions in EN 13200-1:2003 and the following apply.

3.1
separating element or barrier
protective barrier, which is any element of building or structure, permanent or temporary, intended to prevent persons from falling or to retain, stop or guide persons

3.2
external perimeter barriers
barrier which separates the external area from the spectator's service area (see EN 13200-1:2003, Figure A.1)

3.3
activity area barriers
barrier which separates spectator viewing area from the activity area

3.4
segregation element
any barrier which serves to separate areas of standing or seated accommodation from adjoining areas of standing or seated accommodation

3.5
crush barrier
barrier which, combined with appropriate spacing, protects spectators from crushing, positioned in areas of standing accommodation

3.6
barriers in front of and behind seating
barriers specifically positioned immediately in front of or behind seating (see Figure A.1)

3.7
spectator gallery
limited space, usually attached to a hospitality area, from which standing spectators can view the event

3.8
turnstile
gate for admission with revolving arms which allows persons to pass through singly

3.9
temporary barrier
barrier lasting or meant to last for a limited time and that will normally be removed after the event

3.10
datum
finished level of the floor, roof, foundation slab, balcony, ramp, stage or pitch line of stairs, etc.

3.11
design level
level at which the horizontal force on the barrier is assumed to act for the purposes of design

3.12
handrail
rail normally grasped by hand for guidance or support

3.13
infill panel
element of the barrier designed to prevent the risk of person falling

4 General requirements

4.1 Preliminary considerations

4.1.1 In the assessment of the need for a barrier and the type of barrier to be provided, the designer and ground management shall consider the building use and the risks to building users.

Where, in a building more than one use is anticipated, either the barrier design shall be chosen to suit the worst case or more than one type of barrier shall be provided as appropriate to the location.

Where there is a difference in level exceeding 500 mm consideration shall be given to the necessary provision of a barrier to restrict or control the movement of spectators: however barriers may be required in certain circumstances where the difference in levels is less than 500 mm.

4.1.2 Where walls, glazing or other elements of buildings or structures perform the functions of barriers, the designer shall either:

a) ensure that these separating elements satisfy the criteria given in this standard, or

b) provide additional barriers designed in accordance with this standard.

4.1.3 The design of barrier adopted shall be such as to reduce the risk of persons falling, rolling, sliding or slipping through gaps in the barrier to an acceptable level. Except in areas not likely to be used by children, barriers shall be designed so that the widest gap in the barrier does not permit a sphere of diameter of 120 mm (maximum) to pass through, making due allowance for deflection under load. The recommended diameter of the sphere is 100 mm. Barriers shall be non climbable.

4.2 Barrier design and loading

Barriers shall be designed to resist safely the minimum horizontal imposed loads specified in Tables A.1, A.2 or A.3.

Regardless of the height of the barrier (4.4), the horizontal imposed load shall be considered to act at a height of 1,1 m above the datum, when applied as a static load at right angles to the longitudinal axis.

Designers shall ensure that any construction or structure acting as a support for barriers is of adequate strength and stability to resist safely all applied loads, without excessive stress, deflection or distortion.

Where values are given for minimum and recommended levels of loading, the adoption of a value shall be substantiated by documented risk assessment, taking into account the purpose and position of that barrier during its lifecycle.

NOTE Recommended values suit all applications. In applying Table A.1 due accord should be given to National Regulation regarding safety

4.3 Design procedures

For barriers limit state design procedures shall be used, according to the recommended procedure given in the Eurocode appropriate for the material to be used, treating the loads given as characteristic loads, for limit state design.

When using limit state design, the partial safety factors for loads and materials shall be those recommended by the appropriate material's code of practice. The strength of the barrier shall be designed as Ultimate Limit State and the deflection as Serviceability Limit State.

4.4 Barrier heights

Barriers used in standing accommodation, seated accommodation and on stairways and ramps shall be designed to a height of not less than 1,1 m, measured from the datum, unless they fall into one of the following two categories:

a) barriers within 530 mm in front of fixed seating can be a minimum height of 800 mm above the datum (see Figure A.1).

NOTE 1 See E specified Figures 3 and 4 in EN 13200-1:2003.

In such cases consideration shall be given to the horizontal width of the barrier to prevent falling over, i.e. in certain instances a lower height can be acceptable with a wide barrier (see Figure A.1).

b) barriers immediately behind a row of seats should be a minimum height of 1,1m above the datum, which in this case is the level of the seat (Figure A.2).

In all cases, as stated in 4.2, regardless of the height, the horizontal imposed load shall still be considered to act at a height of 1,1 m above the datum.

NOTE 2 Further guidance on the height of crush barriers is provided in 5.4.

4.5 Deflection

A barrier for the protection of people that is structurally safe shall not possess sufficient flexibility to alarm the building users when subjected to normal service.

NOTE This recommendation is in addition to any recommendations for limiting deflection under full load given in the appropriate structural codes for the material to be used, in which event the most onerous limit is to be applied.

4.6 Fixings

Care shall be taken to ensure that the strength of the fixing is adequate for the loading to which the barrier will be subjected. All joints shall be designed to provide the full strength of the members being joined.

Wherever a single fixing or support is essential to prevent the collapse or failure of a barrier, or of a critical part of a barrier, the design shall avoid reliance wholly on the pull-out strength of the fixing. Fixing design shall take particular account of the material into which the fixing is placed, the spacing between fixings, the edge distance, and the position of any reinforcement.

4.7 Safety details

The finished barrier shall have no sharp edges or projections that may cause injury to persons or damage to clothing or other objects.

Infill panels and balusters are intended to provide support and protection to the user, and shall be designed to restrain people without causing additional injury from sharp edges, thin sections, projecting details, etc. (see A.1).

4.8 Support from adjacent construction

Designers shall ensure that any construction or structure acting as support for barriers is of adequate strength and stability to sustain all applied loads safely without excessive stress, deflection or distortion.

4.9 Maintenance

The design shall provide the safe maintenance of barriers. Consideration shall be given to the possibility of tampering or vandalism.

4.10 Barriers and sightline considerations

All spectators viewing areas shall have a clear, unobstructed view of the whole activity area, as defined in EN 13200-1.

NOTE It is recognised that even barriers meeting the height requirements listed in 4.4 may obstruct sightlines.

5 Specific requirements

5.1 General

The requirements for design and loading for all barriers is given in Table A.1, A.2 and A.3. This section is additionally concerned with barriers in the following locations:

5.2 External perimeter barriers

External perimeter barriers subjected to crowd loading at sports ground may include walls, fences, turnstiles, ingress exit doors and gates. The relevant loadings are specified in Table A.1.

Allowance shall also be made for forces simultaneously and independently induced by other factors, for example, wind forces or attached installations.

NOTE 1 Dangerous overcrowding may be caused if spectators are able to force their way into a ground already full or nearly full by scaling or breaking through boundary walls or fences or the gates in them. To avoid this danger such walls, fences and gates should be of appropriate height and strength and should not provide the opportunity for hand or footholds which might assist climbing.

NOTE 2 Consideration should also be given to the security aspects of external fencing particularly the ease with which undesirable objects i.e. flares, canisters, tickets etc may be passed into or out of the venue.

5.3 Activity area barriers

5.3.1 Such barriers can take the form of crush barriers, walls or rails.

The type, height and horizontal imposed load of an activity area barrier will vary according to its location and required function.

NOTE See also Table A.1.

The characteristics of the activity area perimeter barrier and the distance of the barrier from the activity area shall be established by the spectator facilities management in consultation with the relevant authorities and legislation, sports federation and the organiser of the event to ensure safety of spectators, management personnel and participants in the activity area as required.

If spectators can lean on, or gather immediately behind the perimeter barrier, it shall be deemed a crush barrier and therefore meet the horizontal imposed load and height requirements as specified in 5.5.

5.3.2 Emergency access to the activity area

In certain cases forward evacuation onto the activity area may form part of the emergency evacuation plan, provided that the activity area leads directly to an exit which itself leads to a place of safety.

However, regardless of whether the activity area forms part of the emergency evacuation plan, any activity area barrier or fence placed in front of the spectator viewing area shall be provided with gates or openings which allow spectators access to the of activity area.

5.3.3 Requirements dependent upon sports or activities

Individual requirements for specific sports or activities shall be required.

Requirements for the protection of the playing field can be either (or a combination of):

a) police/security;

b) moat;

c) high seating configuration;

d) insurmountable fences (either permanently fixed or removable).

In all instances the agreed and specific requirements set out in Clauses 4 and 5 shall be maintained.

Any additional requirement imposed by a sport or activity shall also ensure compliance with the above and shall not present additional dangers or prevent means of escape where this is required.

The activity or sport shall not present any undue safety hazard upon spectators.

NOTE1 In sports such as ice hockey or motor racing special measures should be undertaken to ensure protection of the spectators from the sporting activity.

NOTE 2 UEFA states "it has to be recognised that, where it is safe to do so, a more civilised and pleasant atmosphere can be generated in a stadia which does not have fences and screens".

5.4 Segregation elements

5.4.1 Large areas of standing or seating places, or physically adjoining areas of standing or seating places, are subject to migration, which in turn can lead to dangerous overcrowding. In such cases it shall be necessary to introduce structures and/or management controls to separate the areas into divisions.

5.4.2 Dividing structures shall be designed or sited in such a way that they do not restrict the views of spectators. If they do, the affected areas shall be discounted from the spectator viewing area.

NOTE 1 Any division of standing accommodation should comply with the following recommendations:

a) each division should have its capacity assessed separately;

b) entry to each division should either be controlled by its own designated turnstiles, or by other entry arrangements, which allow management to keep an accurate count of the number of spectators admitted. Mechanical devices for segregation or counting visitors like revolving doors or turnstiles in emergency egress way are not acceptable;

c) when dividing areas of standing accommodation, the siting of dividing barriers, walls or fences should be such that each division functions safely as a separate unit, in terms of its crush barrier configuration, gangways, and its means of ingress, egress and emergency evacuation (including activity area, gates or openings);

d) if required to withstand crowd pressures, all barriers (including walls or fences) used to divide one section from another, should be designed, constructed and maintained to withstand those pressures safely.

NOTE For height above 1,1 m refer to Table A.1, Type 11

In situations where dividing structures might be vulnerable to crowd pressures, the use of brick, block work or other solid structures is not recommended. Where they are used, they should be subject to regular appraisal by competent persons of the appropriate skills and experience;

e) Where the separation is achieved by means of radial divisions, where appropriate, gangways should be provided on either side, to discourage lateral movement and prevent spectators pressing up against the dividing structures.

NOTE 2 At certain sports grounds - for example those staging horse or greyhound racing - it is customary to allow spectators to move freely between various areas of spectator accommodation.

NOTE 3 Parts of spectator entry arrangements should be in place to provide for orderly ingress.

NOTE 4 Premises for access control and security check for persons and items should be provided.

Separate entrance for personal on duty, police, fire brigade, ambulance, rescue service shall be allocated apart from general entrances for spectators.

However, if free movement of spectators is to be allowed between standing areas, or between standing areas and any other areas of spectator accommodation (including circulation areas), the management shall ensure that appropriate measures are taken to control and monitor the situation at all times and in all weather conditions, to ensure that the capacity of each area is not exceeded.

5.5 Crush Barriers

5.5.1 Main design criteria

Standing places with block shall be limited according to relevant authorities and legislation, sports federation and the organizer the organizer the event.

In spectator facilities where standing accommodation is provided, many of the hazards arising from crowd pressure on terraces and viewing slopes can be eliminated by the provision of crush barriers that are appropriately designed and constructed.

The main considerations concerning the design and construction of crush barriers are detailed in the following sections, and can be summarised as follows:

a) characteristics of a crush barrier shall be established by the spectator facilities management in consultation with relevant authorities and legislation, sports federation and the organiser of the event to ensure safety of spectators, management personnel and participants in the activity area as required;

b) this Clause shall be read in conjunction with EN 13200-1 concerning the overall design and management of standing areas. Detailed reference shall also be made to Table A.2;

c) angle of slope of the terrace or viewing slope, which in turn will determine the appropriate spacing of the crush barriers and the required horizontal imposed load for each crush barrier (see 5.5.2);

d) configuration of the crush barriers in relation to gangways;

e) height and positioning of the crush barriers in relation to the treads or surfaces of the standing area;

f) construction and condition of the crush barriers.

5.5.2 Crush barriers - factors determining the horizontal imposed load

The required horizontal imposed load for crush barriers is determined by the angle of the terrace or viewing slope, in relation to the horizontal distance between the crush barriers, as shown in Table A.2.

Table A.2 indicates that the steeper the angle of slope and the greater the horizontal distance between crush barriers, the greater the horizontal imposed load required for those crush barriers.

a) Angle of slope

The angle of slope (or gradient) is the first factor to be considered when determining the required horizontal imposed load for crush barriers.

b) Horizontal distance between crush barriers

Having established the angle of slope, Table A.2 is used to determine the appropriate crush barrier loading and spacing.

NOTE 1 Table A.2 allows flexibility to select barrier loadings between 2 kN/m and 5 kN/m dependent on gradient and barrier spacing

NOTE 2 Crush barriers - height and positioning

In order to locate the top rail of a crush barrier against that part of the body most able to tolerate pressure, and to accommodate a typical range of spectators, a reasonable height for the top rail is 1,1 m.

To allow spectators sufficient room to stand safely and comfortably behind a crush barrier, crush barriers should be positioned immediately in front of a terrace step's riser, or if not, at the front of a step. In both cases, the 1.1 m is measured from the step on which the spectator stands to the top of the crush barrier's rail.

NOTE 3 Crush barriers - Construction

Crush barriers should be constructed taking into account the following recommendations:

a) There should be no sharp projections or edges.

b) It is recommended that the crush barrier's top rail should be flat and measure 100 mm in vertical depth.

5.5.2.1 If the standing area has no crush barriers, but has a front barrier (be it a barrier, rail, wall or fence) which meets the horizontal imposed load requirements of a crush barrier, the available spectator viewing area shall be limited to the space immediately behind the front barrier, depending on the strength of the barrier.

NOTE 1 Where there are no crush barriers, and the front barrier does not meet the horizontal imposed load requirements of a crush barrier, it is recommended that the available viewing area does not exceed a depth of 1,5 m behind the front barrier. In practical terms this is the equivalent of approximately four persons deep.

NOTE 2 Combined standing and circulation areas

As is the case for any section of a sports ground where free movement of spectators is common, a reduction in the capacity will be necessary in order to facilitate safe movement. This reduction may be severe where there is not only free movement but where viewing areas are used also for circulation.

5.6 Barriers in front and behind seating

The height requirements for barriers in front of and behind seating are illustrated in Figure A.1. Imposed loads are given in Table A.1.

5.7 Barriers in spectator galleries

Viewing galleries (not circulation areas or passage ways) for standing spectators are generally attached to hospitality areas at sports grounds staging sports such as horse or motor racing. Although the number of spectators who have access to such galleries is limited by the capacity of the hospitality area, the front barrier shall be designed to withstand crowd loading.

Table A.3 specifies the required horizontal imposed loads, which vary according to the horizontal distance between the barrier and either the rear wall of the spectator gallery or any restraint.

5.8 Ingress and turnstiles

5.8.1 General

Turnstiles used for entry shall not be used for exits.

5.8.2 The need to count

Spectators entering all sections of the spectator facilities, including VIP and lounge areas, shall be accurately counted at their time of entry, and their number controlled in order to ensure that overcrowding does not occur and that the safe capacity or capacities are not exceeded. This applies even if entry to the event is by ticket only.

5.8.3 Loads

See Table A.1 of external perimeter barriers.

5.9 Exit doors and gates

5.9.1 Loads

See Table A.1 of external perimeter barriers.

5.10 Temporary barriers

5.10.1 If a temporary barrier or separating element is to be provided, the purpose for which it is to be used shall be clearly stated and the barrier designed in accordance with the relevant design criteria, as any otherwise similar permanent provision (for example: crush barriers, segregation elements etc.).

5.11 Front of stage barriers

5.11.1 Front of stage barriers provide additional safety for events such as concerts and other occasional events. They are primarily used to separate the audience viewing area from the activity area (stage and associated equipment). The front of stage barrier is normally temporary and assembled on site from prefabricated elements.

5.11.2 A risk assessment shall be required for individual rise of a barrier

5.11.3 It is recommended that the range of height of such a barrier should be between 1,05 m to 1,20 m.

NOTE Designers may consider that, for a young audience, which may have a high proportion of young females in the front of stage area, the lower barrier may be more appropriate

5.11.4 A front of stage barrier should be designer to resist a characteristic uniform line loading, in accordance with the risk assessment.

5.11.5 In order to provide for the integrity of the barrier, it is necessary to consider failure of a component part, slip and overturning.

5.11.6 Due to the nature of the audience and the resultant loading on a front of stage barrier, particular attention needs to be given to the design of components of a front of stage barrier in order to minimise the risk of personal injury.

5.11.7 A passageway shall be formed to the front of the stage barrier to form a clearance for security personnel and emergency medical service. The recommended width of this passage is 2 m.

5.11.8 Additional barriers shall be considered in order to avoid uncontrolled movement of spectators as determined by the risk assessment.

Annex A
(normative)

Tables and Figures

Table A.1 — Horizontal imposed loads for barriers

Barrier type reference	Barrier type description	Value or recommended range of values of imposed loads (KN/m length)
E	Barriers for seating deck, behind a rear row of seats and protecting spectators from falling backwards	1,0
D	Barriers for seating decks, adjacent to the end row of seats and protecting spectators from falling sideways	1,0
C	Barriers positioned within 530 mm in front of seats	1,5
F	Barriers for stairways, landings and ramps, aligned with the direction of movement of spectators	2,0 to 1,5
A	Barriers for gangways of seating decks parallel to the direction of spectator movement	2,0 to 1,5
I	External perimeter barriers and activity area barriers; interpolation between the numbers is permitted	3,0 to 2,0 at a designed height of 1,1 m 1,0 at height a designed of 2,5 m
B	Barriers for gangways of seating decks, aligned at right angles to the direction of spectator movement	3,0 to 2,0
G	Barriers for stairways, landings and ramps, aligned at right angles to the direction of movement of spectators	3,0 to 2,0
H	Barriers for gangways in standing areas, aligned at right angles to the direction of spectator movement	5,0 to 2,0
J	Crush barriers for standing accommodation	See Table A.2
K	Barriers for spectator galleries	See Table A.3

NOTE 1 The lower values should be considered the minimum values.

NOTE 2 In applying Tables A.1, A.2, and A.3 due accord should be given in applying national guidelines regarding safety.

Table A.2 — Horizontal imposed loads for crush barriers

Angle of terrace or viewing slope	**Horizontal distance between crush barriers**				
5°	5,0 m	4,0 m	3,3 m	3,0 m	2,0 m
10°	4,3 m	3,4m	2,9 m	2,6 m	1,7 m
15°	3,8 m	3,0 m	2,6 m	2,3 m	1,5 m
20°	3,4 m	2,7 m	2,3 m	2,0 m	1,3 m
25°	3,1 m	2,5 m	2,1 m	1,8 m	1,2 m
Recommended horizontal imposed load	**5,0 kN/m length**	**4,0 kN/m length**	**3,4 kN/m length**	**3,0 kN/m length**	**2,0 kN/m length**

Table A.3 — Horizontal imposed loads for barriers in spectator galleries

Distance	3,6 m	1,8 m
Recommended Horizontal imposed load	3,0 kN/m length	1,5 kN/m length

A.1 General notes to Tables A.1, A.2 and A.3

All barriers should be capable of resisting proof loads equivalent to 1,2 times the horizontal imposed loads listed in the tables.

Barrier foundations should be designed to resist the overturning moments and sliding forces induced by the horizontal imposed loads with a factor of safety of 2.

Loads specified in these tables should be treated as unfactored or characteristic loads for design purposes

Infill panels shall be provided to prevent risk of falling spectators. It is recommended that the minimum uniformly distributed load on the surface of infill panel shall be 2,0 kN/m^2.

(See Eurocode EN 1991-1-1. This loading shall be considered separately to the horizontal imposed load of 1,1 m height).

A.2 Notes to Table A.1

This table should be read in conjunction with Figure A.1 and Figure A.2.

All references to seats are to fixed seats (that is, any seat, tip-up or otherwise), attached to the main structure.

In relation to Eurocodes (EN 1991-1-1) overcrowding is considered to be spectator occupancy exceeding 3 persons/m^2.

Barrier Type 11 – For barriers height of more than 1,1 m the additional design requirements should be separately considered

A.3 Notes to Table A.2

Interpolation may be made between these figures.

Crush barriers should be arranged so that the horizontal imposed load on them will not exceed 5KN/m, this is because a transient load greater than 5 kN/m on the spectator immediately behind a crush barrier risks physical injury.

The horizontal distances specified are the maximum recommended according to the barrier strength and the angle of slope. The available viewing area should be limited to the area behind the barrier, which falls within the maximum distance.

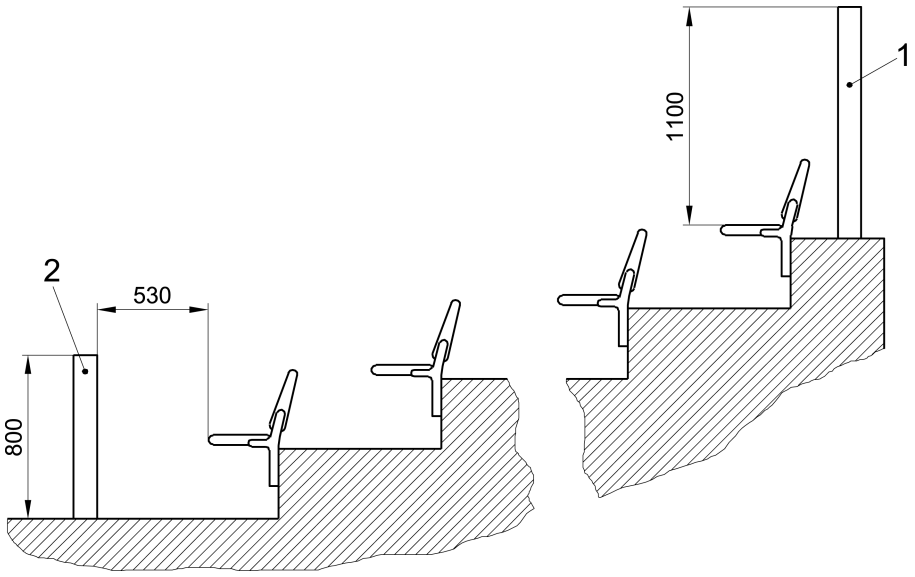
A.4 Notes to Table A.3

Interpolation may be made between these figures.

The required horizontal imposed load should be calculated according to the distance between the gallery's rear wall, or any other restraint

If the spectator gallery also forms part of an escape route, the barrier's horizontal imposed load should be no less than 2 kN/m length.

Dimension in mm



Key

1 type F barriers behind a row of seats should be a minimum height of 1,1 m, measured from the seat level

2 type G barriers positioned within 530 mm in front of a row of fixed seats (including fixed tip-up seats) should be a minimum height of 800 mm above the datum. It is also recommended that, where appropriate, the top surfaces of such barriers should be designed to prevent their use as shelves for items which might fall off and endanger spectators.

NOTE 1 For barriers in front of fixed seating; consideration should be given to increasing the horizontal width of the barrier to prevent falling over. For example – the height of barriers should differ in accordance to their width:

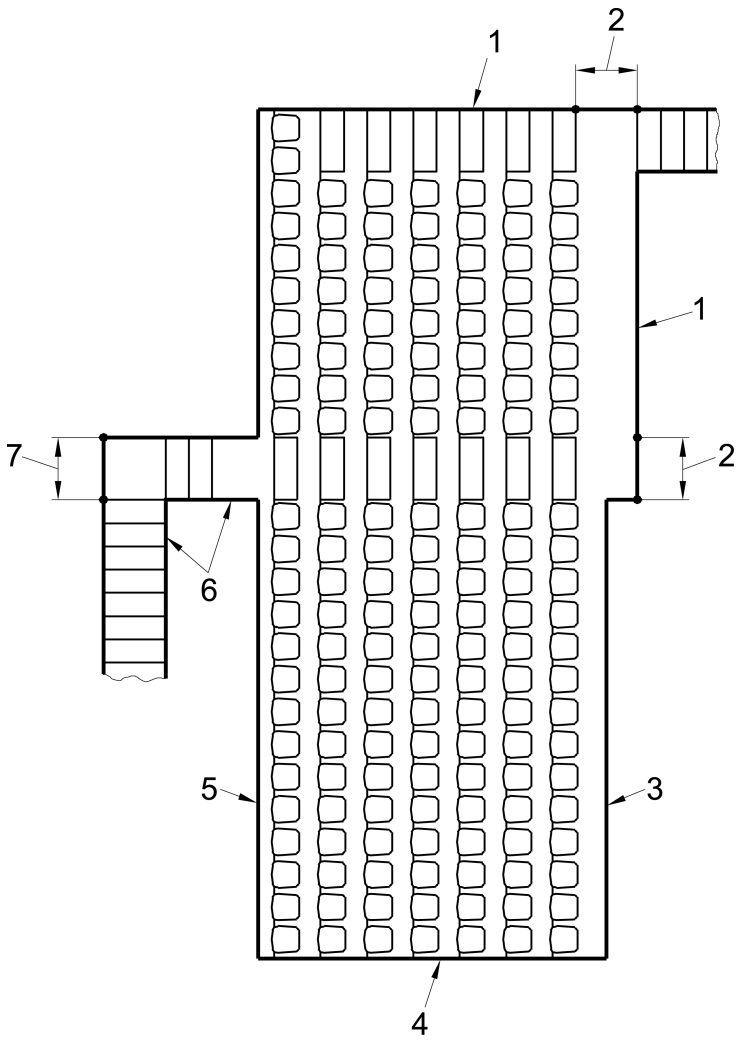
- 0,8 m height = 0,2 m width (as recommended value)

- 0,7 m height = 0,5 m width (as recommended value)

Interpolation between this numbers is permitted.

NOTE 2 For barriers behind seating consideration should be given to raising the height to 2 m above seat level if there is a possibility of spectators sitting on the barrier.

Figure A.1 – Examples of barriers in front of and behind seating



Key

1 Type A side and lateral barrier, aligned parallel to the direction of spectator movement. Height 1,1 m

2 Type B barrier at the foot of a gangway. Height 1,1 m

3 Type C barrier within 530 mm in front of a row of fixed seats. Height 800 mm

4 Type D barrier adjacent to end row of seats. Height 1,1 m

5 Type E barrier behind a rear row of seats. Height 1,1 m above level of seats

6 Type F barrier at the side of a stairway, aligned with the direction of movement. Height 1,1 m

7 Type G barrier on a stairway, aligned at right angles to the direction of movement. Height 1,1 m

NOTE This diagram illustrates the types of barriers used in seating decks, stairways and gangways. The type numbers correspond with those listed in Table A.1.

Figure A.2 – Example of barrier type references, heights and positions

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