



In association with



**An Essential Guide
to
BS EN 1176
And
BS EN 1177**

**Children's Playground
Equipment and Surfacing**

The interpretations are those of the Rob Davies of Wicksteed Leisure Ltd. and Peter Heseltine of The Play Inspection Company. Other interpretations are possible. Where there is a dispute, reference should be made to the published Standard and to any interpretation committee which is established in the UK or Europe.

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Introduction

Two main standards for playground equipment were used in the UK - BS 5696 and DIN 7926 until the end of 1998. The European Standard came into effect on January 1, 1999 and is applicable throughout the European Union. **CHANGES AGREED OR PROPOSED FOR THE END OF 2005 ARE IN RED.**

BS EN 1176 *Playground Equipment* is published in seven parts:

To be retitled "Playground Equipment and Surfacing"

Part 1: General safety requirements and test methods

Part 2: Additional specific safety requirements and test methods for swings

Part 3: Additional specific safety requirements and test methods for slides

Part 4: Additional specific safety requirements and test methods for runways

Part 5: Additional specific safety requirements and test methods for carousels

Part 6: Additional specific safety requirements and test methods for rocking equipment

Part 7: Guidance for installation, inspection, maintenance and operation

Part 11: Additional specific safety requirements for climbing equipment

BS EN 1177 *Impact absorbing playground surfacing. Test methods.*

BS 7188 *Impact Absorbing Playground Surfaces: Performance Requirements and Test Methods (Published 1998 and covers some aspects of surfaces not applicable outside the UK)*

These notes summarise the main requirements of the standard for the interested lay person where these may be assessed on site. It does **not** replace the Standards. In the event of legal claims or disputes, reference should be made to the full Standards, copies of which are available from **BSI Publications, 389 Chiswick Road, London, W4 4AL**

The main changes from the old standards (BS 5696 and DIN 7926) were in the areas of the overall height of equipment, equipment separation (Minimum Use Zone), and surfacing areas. There were some dimensional changes in other areas and a number of new requirements. A significant change related to under-three year-olds: specific requirements for access, guarding and entrapment have been made for equipment accessible to them. **Under-three's are expected to be under supervision when using the playground.** As the Standard has become used, aspects of the requirements are being clarified and amendments issued. **The specific requirements for under-three's are to be removed and the Standard re-worded to expect under-three's to be able to access all equipment unless specifically excluded.**

In 2005, BS EN1177 will solely concern the testing of impact absorbing surfaces. All other requirements and recommendations will be transferred to BS EN 1176.

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Legal Background

The European Standards (BS EN 1176 and BS EN 1177) harmonised existing national standards (principally BS 5696, parts of BS 7188 and DIN 7926 (the German standard)).

BS EN 1176 is not retrospective or, currently, as with previous standards, a legal requirement in the UK but represent good practice in the event of an accident claim. Their limitations should be recognised: mere compliance will not automatically create a safe playground or give immunity from legal proceedings. Like previous playground standards they are intended to be used intelligently. **The Health and Safety Executive have issued a guidance note LAC 79-2 Safety in Children's Playgrounds. Copies available from the HSE and can be downloaded from www.hse.gov.uk/lau/lacs/79-2.htm**

BS 5696, DIN 7926 and part of BS 7188 have been withdrawn. Equipment produced before BS EN 1176 (January 1,1999) should meet BS 5696 or DIN 7926 or have undergone third party testing, for example by carrying a TÜV certificate or a BSI Kitemark and be subject to a risk assessment in the UK.

N.B. There are differences between BSI Kitemarks and TÜV certificates. Suppliers can notify prospective purchasers of the implications of each. Both give good indications of safety and suitability

*Where there are differences between the new and old standards, our advice is **DON'T PANIC!** Equipment that has been perfectly safe under BS 5696 or DIN 7926 for 20 years did not suddenly become dangerous the day after publication of BS EN 1176.*

New equipment should meet BS EN 1176. BSI and TÜV's will use BS EN 1176 in assessing compliance. The same applies to the provision of impact absorbing surfaces.

As will become apparent, some elements of EN 1176 are open to opinion. In the event of a dispute, advice, information and guidance on interpretation may be sought from BSI's Technical Committee SW/65 and decisions from the European Standards Committee, CEN/TC136/SC1. There were some changes to the Standard in the early years as experience was gained from practical implementation on site. Common sense and risk assessment will remain a good guide.

ANCILLARY ITEMS

ISO/IEC Guide 50 may apply to ancillary items. This means items such as fences, gates, litter bins, seats. Etc. should meet BS EN 1176.

A NUMBER OF NEW PRODUCTS ARE APPEARING ON THE MARKET THAT ARE NOT COVERED BY THE TYPES OF PRODUCTS FOUND IN PARTS 2-6 OF THE STANDARD. WHERE THEY ARE NOT COVERED BY THESE ADDITIONAL REQUIREMENTS, THEY SHOULD MEET THE RELEVANT REQUIREMENTS OF PART1. LIKE ALL EQUIPMENT THEY SHOULD THEN BE SUBJECT TO A RISK ASSESSMENT IN THE UK. A TÜV CERTIFICATE FORMS PART OF THIS ASSESSMENT

Definitions

The official definitions may be found in the Standard - the explanations which follow attempt to explain them in every day terms. The definitions selected are primarily for the purchaser: others that affect the manufacturer or supplier have not been included. Additional definitions are included in each part of the additional requirements.

- **Playground equipment:** these are items provided for outdoor play such as swings, slides, roundabouts etc. or where such outdoor items are used indoors. Although not stated we believe this refers to permanently fixed equipment only - equipment produced for the home is **not** covered by this Standard (EN 71 and the Toy Directive apply). It does not include soft-play areas, skateboard areas or ancillary items, such as fences, seats, litter bins etc. European standards for contained indoor play and wheeled sports are being developed.
- **Climbing equipment:** items on which children cannot stand unaided but must hold on
- **Playing surface:** the ground
- **Forced movement:** a movement to which a child is committed by the design of the equipment (i.e. a swing, slide or fireman's pole)
- **Free space:** the space which children are forced to use by the action of the equipment (i.e. the swing arc, slide chute or fireman's pole)
- **Falling space:** the space through which the child falls from the point of fall
- **Free height of fall:** distance from the clearly intended body support or position which can easily be reached to the impact area (the critical fall height - CFH)
- **Collective use:** use by more than one user at a time
- **Ladders, stairs and ramps:** primary means of access, the difference between them being detailed on Page 12
- **Impact area:** the area where the child will strike the surface or another item or part of equipment (see also Section on surfacing - Page 22)
- **Grip and grasp:** a part which the child needs to support their weight will require "grip" and a part the child uses for balance would require "grasp".
- **Obstacle:** a piece of the equipment extending into the path of movement
 - i. *in the free space, something in the path of a user undergoing forced movement*
 - ii. *in the falling space a hard and sharp object the user can strike during a fall*
 - iii. *other types of movement – something unexpected likely to cause a collision by the user.*
- **Family of products:** modular or multi-play equipment
- **Not easily accessible:** accesses designed to discourage unaided use by children under 36 months. Specific requirements are being developed. The definition is being revised.
- **Cluster:** separate items designed to be grouped together (i.e adventure trails). **N.B.** Space between individual items in the cluster must be appropriate to the intended age, for example, no more than 500mm to enable a suitable step to be made.

Marking

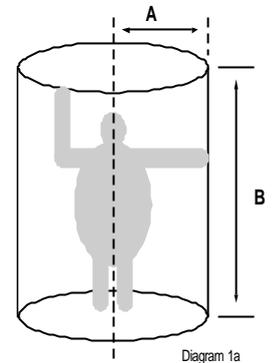
Equipment should be permanently marked and include:

1. Manufacturer or authorised agent
2. Year of manufacture
3. Equipment reference
4. Basic level mark
5. Number and date of EN 1176

Minimum Space Around Equipment and Zones

The equivalent to the Minimum Use Zone in BS 5696. It is made up of three parts:

- space occupied by equipment
- free space (only applies where there is 'forced' movement and this distance should be stated by the supplier)
- falling space (surfacing area). Free spaces may not overlap, falling spaces may overlap but free spaces + falling spaces may not overlap (Other than for cluster items)
- The *free space* is measured vertically as well as horizontally (i.e. as if a tin can is enclosing the child and moving with the equipment or motion - *Diagram 1a*)
Standing A: 1000mm B: 1800mm
Sitting A: 1000mm B: 1500mm
Hanging A: 500mm B: 300mm above the hanging position and 1800mm beneath
- Some equipment may have different distances set by the supplier.

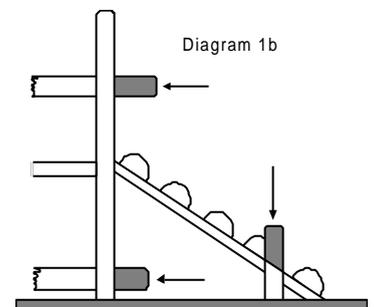


PROTECTION AGAINST INJURIES IN THE FREE SPACE

- No obstacles in the free space (other than structures to assist or safeguard the user, for example, platforms with fireman's poles or hand-rails)
- Traffic flows should not go through the free space

PROTECTION AGAINST INJURIES IN THE FALLING SPACE

- Free height of fall should not exceed 3m
- No obstacles in the falling space (i.e solid bar at base of angled nets or links)
- The impact absorbency of the surface should be sufficient for the free fall height
- Dimensions are as given in Surfacing section (*Page23*)
- Platforms with fall heights of more than 1m between them require impact absorbency



PROTECTION AGAINST INJURIES DUE TO OTHER TYPES OF MOVEMENT

No unexpected obstacles (*Diagram 1b*)

General Safety Requirements

MATERIALS

- Materials and product finishing treatments should meet Standard requirements if available **or** be suitable for their purpose
- **Flammability:** use flash resistant materials
- **Timber:** timber should be resistant to ground decay by selection of the correct species, construction method or preservatives
- Metal fastenings should not be corroded by the timber species used, by any paint or preservative
- Preservatives should be to BS EN 351-1. No coal-tar oils (i.e. creosote)
- Weather-proofed plywood should meet BS EN 636-3
- **Metal:** metals should be protected against corrosion by severe climate, special natural conditions (salt water) or environmental pollution. (Suppliers can advise on special treatments). Metal producing toxic oxides/flaking must **be protected by a non-toxic coating**
- **Synthetics:** **it should be possible to identify wear in the gel coat of GRP, for example, by an indicator colour layer.** There should be no UV degradation (if there is a risk of brittleness, the manufacturer must notify the purchaser of the replacement time-scale)
- **Toxic materials:** materials such as lead in paint must not be used

DESIGN AND MANUFACTURE

The equipment must be suitable for the user and risks should be identifiable by the child. This may require separation by age group.

- **Accessibility:** adults must be able to gain access to help children
- **Grip requirements:** permitted diameter 16 - 45mm **Grasp requirements:** maximum diameter 60mm
- **Not easily accessible:** for children under three there should be 400mm from the surface to the lowest foot hold or 600mm from the top surface of a platform – **under revision**

FINISHING

- Timber species and synthetics should be splinter resistant
- No protrusions or sharp edged components
- Bolts should conform to *Diagram 3*

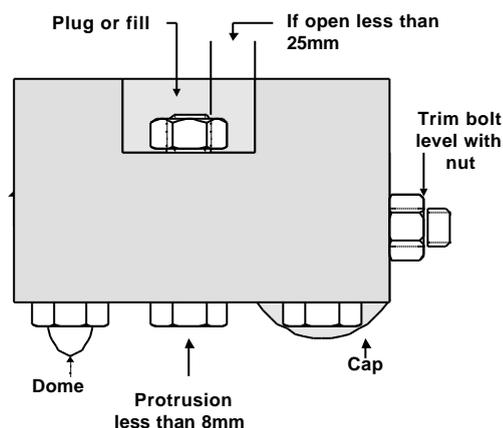


Diagram 3

- Grind welds smooth
- Corners, edges or projecting parts over 8mm should have a 3mm radius
- No hard **and** sharp-edged parts (i.e. razor blade effect caused by sheet steel)
- No crushing or shearing points
- Where equipment comes to a stop, it should be cushioned (i.e. dampers on rocking items)
- **Connections:** nuts and bolts should not come loose by

themselves and resist removal (**The term 'resist removal' is our interpretation of the intention of the Standard**). Timber connections should not rely solely on screws or nails **N.B.** Nails alone may not withstand the tests for structural stability

- **Consumable components:** these should be replaceable by the operator only
- Leaking lubricants should not stain or impair the safety of the equipment

Ropes and Chains

This section covers swinging and climbing ropes and chains but not nets. Part 11, when published will contain specific requirements for spatial networks (not scramble nets).

FIBRE ROPES

- Conform to EN 701 or 919 or have a material and load certificate
- Ropes used by hands shall have a soft, non-slip covering

WIRE ROPES

- Non-rotating and corrosion resistant with no splayed wires outside the ferrule
- Wire connector clip threads should protrude less than 8mm
- Turnbuckles should be enclosed, have a loop at each end and be secured

SHEATHED WIRE ROPES

When sheathed wire ropes are used each strand should be covered with synthetic or natural yarn

N.B. Our opinion is that in practice the rope only need be a covered, not individual strands.

CHAINS

- Maximum opening of individual links: 8.6mm in any one direction.
- Connecting links between chains must be less than 8.6mm or over 12mm

SWINGING SUSPENDED ROPES

- Not combined with swings in the same bay.
- Less than 2m long: over 600mm from static parts
 over 900mm from swinging parts
- 2m - 4m long: over 1000mm from any other part or component
- Rope diameter: 25 – 45mm

CLIMBING ROPES

- Anchored at both ends and movement less than 20% of rope length (a change is proposed)
- Single climbing rope diameter: 18 - 45mm (nets comply with Grip requirements)

Entrapments

There are seven probes: the Torso Probe (C), the Large Head Probe (D), Probe 1 (A), Probe 2 (B), the Wedge Probe and the two Finger Probes. **A new probe (E) is being proposed to test bound flexible openings.** Only two probes are used for testing any opening depending on age and likely direction of entry. There is also a toggle test to reduce the dangers of clothing toggles being caught. Full details of the test methods may be found in the Standard. Dimensions are given on the inside back cover.

DEFINITIONS

- **Entrapment:** a place from which children cannot extricate themselves unaided
- **Crushing point:** a place where the equipment moves to entrap a child
- **Shearing point:** a point where the equipment moves to create a cutting injury
- **Bound opening:** an opening with four sides (i.e. a tunnel or net)
- **Non-bound opening:** an opening with three sides (i.e. a space between a platform and two verticals)

N.B. Head, neck and torso entrapments start at 600mm above the ground **or** standing surface

ENTRAPMENT OF HEAD AND NECK IN COMPLETELY BOUND, PARTIALLY BOUND, SHEARING OR MOVING OPENINGS

- No head or torso entrapments whether entering head or feet first

TEST FOR CHILDREN OVER 3

- Rigid completely bound openings (feet first): if small probe (A) enters to its full depth then large head probe (D) must pass through to the depth of probe, not including the handle.
- All other cases: if small probe (B) enters to its full depth then large head probe (D) must pass through to the depth of probe

N.B. Probes are not rotated as in BS 5696. Ignore the taper.

N.B. In our opinion this test should not be used unless it can be guaranteed that children under three will **never** use the equipment. Use the tests for **all** children

TESTS FOR ALL CHILDREN

- *All cases:* if the torso probe (C) enters then the large head probe (D) must also pass through to its full depth, not including the handle.

N.B. If the torso probe fails to enter to its full depth, there is no entrapment.

WEDGE ENTRAPMENTS

If *Portion B* can be inserted flat to a greater depth than the thickness (45mm) then *Portion A* should touch the bottom without touching the sides. **The tests have been re-written to include angled and inclined openings. The flat 'T' shape has been increased in size to be the same as Probe D.**

TOGGLE TESTS

This is to assess whether clothing can be trapped and is used on slides, fireman's poles and accessible roof ridges. This does not refer solely to anorak-type toggles. **The chain length is to be decreased and a size given for the toggle stand base.**

Slides: For narrow slides, place on centre line, move forwards keeping pole vertical - toggle or chain should not be caught. Do not use force: the test is where the chain or toggle can be caught naturally.

For wide slides, position at both sides of chute surface
The test is applied for the whole chute length

Fireman's poles:

1. Position the device vertically at the edge of the platform nearest the pole – there should be no entrapment of the toggle
2. Remove toggle and chain, hold 1.8 above platform and re-test
3. Continue test down the pole to height of 1.2m from the ground

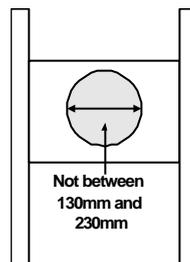
Roofs Remove chain and toggle and apply to any openings in the apex or surface in a downward motion to fail any entrapment

N.B. Consideration is being given to the toggle test being applied to any area of forced movement (i.e. a roundabout)

OTHER CASES

Rigid openings (not tunnels) (Diagram 4)

Diagram 4



NON-RIGID MEMBERS (I.E. ROPES AND CHAINS)

- As for rigid circular openings but overlapping must not create an entrapment

BRIDGES

- The space between the flexible bridge and rigid sides should be not less than 230mm

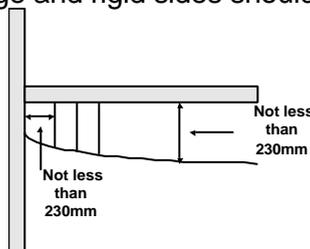


Diagram 5

ENTRAPMENT OF THE WHOLE BODY

These may occur:

- in tunnels, for example (not tube slides)
- If tunnels are open at one end only they should:

- slope less than 5°
be sloped upwards on entry
have an internal diameter over 750mm
be less than 2m long
- If open both ends
 - slope less than 15°
have an internal diameter over 400mm & be less than 1m long
or
have an internal diameter over 500mm & be less than 2m long
or
have an internal diameter over 750mm with no limit on length
 - slope greater than 15°
have an internal diameter over 750mm with no length limit
have provision for internal climbing (e.g. steps or handles)
- Moving equipment suspended above the user should be at least 400mm from the playing surface (not swings - see separate requirements)

ENTRAPMENT OF FEET AND LEGS

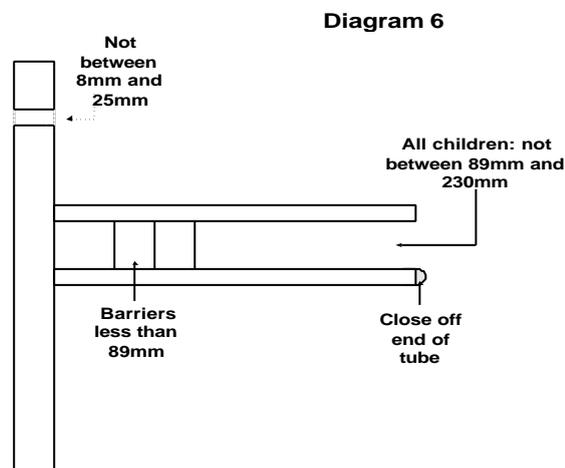
These may occur where there are holes in platforms, bridges etc.

- Inclined planes (not suspension bridges) less than 45° should have no gaps over 30mm (There are no requirements for suspension bridge gaps other than the main entrapment requirements)

FINGER ENTRAPMENTS

These may occur in:

1. gaps where the movement of the child may cause a finger to become stuck
 2. open-ended tubes
 3. moving gaps
- Openings within the free space or with a lower edge over 1200mm above the playing surface should be below 8mm in one direction (i.e. a slot)
 - If the 8mm probe enters, the 25mm probe should also enter (not chains)
 - Probes should not encounter other entrapments when inserted to 100mm
 - Tube ends should be securely enclosed and removable only with tools
 - Moving gaps should not close to less than 12mm
 - *Diagram 6* shows entrapment distances



Barriers and Guardrails

There are different requirements for under and over-three year-olds and differing requirements for guardrails and barriers. Heights have decreased from BS5696. Surfacing should be appropriate to the free-fall height.

DEFINITIONS

- **Hand-rail:** a rail to help the child balance
- **Guard-rail:** a rail to prevent children falling
- **Barrier:** a guard-rail with non-climbable in-fill

HAND-RAILS

Where required they should be between 600 and 850mm above standing surface

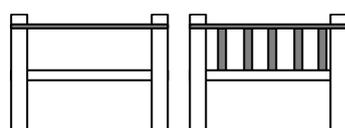
EQUIPMENT FOR UNDER 3'S

- Platforms over 600mm require a barrier with a minimum height of 700mm high + impact absorbing surfacing

EQUIPMENT FOR OVER 3'S

- Platforms up to 1000mm - No barriers or guard-rails required + impact absorbing surface over 600mm (can be grass up to 1m)
- Platforms 1000-2000mm: 600 - 850mm high guard-rail + impact absorbing surfacing
- Platforms 2000-3000mm: 700mm high barrier + impact absorbing surfacing

Diagram 7



Guard-rail Barrier

No bars, infills or steps which can be used as steps. Tops should discourage standing or sitting

OPEN SIDED PLATFORMS

- At the access to play items from a platform (i.e. a fire pole) the space in the barrier is 500mm, unless there is a guardrail.
- Width for steps, ladders ramps should be the same as the access item.
- For play elements with an inclination over 45° (e.g. scramble net) the opening is 1200mm max.

Means of Access

Probes should be applied to all accesses. All means of access should have no entrapments; be securely fixed; be level to $\pm 3^\circ$ (ramps across width) and have a constant angle. It does not refer to agility equipment used as an access i.e. arched climbers, scramble nets.

LADDERS (Normally angled $60^\circ - 90^\circ$ to the horizontal)

Ladders should:

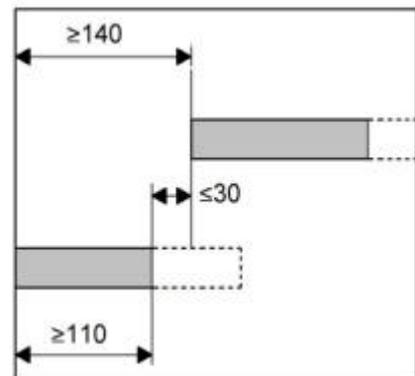
1. have rungs and/or sides up to 60mm diameter (grasp) or have hand-rails 16-45mm (grip). Near vertical ladders i.e. within 10° : apply grip requirements. Rungs require *grip* and sides require *grasp*
 2. be evenly spaced (bottom rungs can be omitted to discourage young children)
 3. be non-rotating and equally spaced
- Timber fixing methods should be secured against removal
 - There should be a clear space behind the rung or step, when measured from the tread centre line, of more than 90mm when measured at 90° to the ladder
 - Ladder sides may be higher than the platform

STAIRS (normally angled between 15° and 60° to the horizontal)

Stairs should:

1. have at least three risers
 2. be evenly spaced
 3. have a minimum tread depth of 140mm **to be changed to 110mm**
 4. have the back of the tread aligned with the next tread front. **For change see drawing**
- Stairs over 2m in vertical height should have intermediate platforms at less than 2m intervals, the same width and be over 1m long. They should change direction by 90° or be off-set (not on free-standing slides up to 2.5m)
 - Hand-rails are required on stairs over 1m & 45° & should meet hand-rail requirements
 - Under-three's equipment should have handrails from the first step

Diagram 8



RAMPS (normally inclined surfaces up to 38° from the horizontal)

Ramps should:

1. have slip-resistant measures if accessible to all ages i.e. footholds
2. have barriers at least 700mm high for under three's if the ramp is over 600mm above surface
3. under-three's equipment should have handrails from the lowest point

Swings

These requirements refer only to the **four** types of swing identified.

DEFINITIONS

- **Swing height:** distance between pivot centre and ground surface
- **Swing suspension:** distance between pivot centre and seat surface
- **Ground clearance:** distance between lowest part of seat and ground
- **Seat height:** distance between top of seat and playing surface

TYPES

Type 1: Traditional classic swing

Type 2: Swing with restricted movement

Type 3: Single point swing

Type 4: Hexagonal swings

REQUIREMENTS

- No all rigid suspension members (i.e. solid bar top to bottom)
- Design for *Type one* and *two* swings should be principally for use by seated children and *Type three* by standing children
- Two seats per bay maximum. Do not mix cradle and flats seats in same bay
- Cradles should be designed so children do not slip through the frame
- Some additional types of swings have slightly different requirements. Information should be obtained from the supplier or look for a TÜV certificate
- *Type three* swing chains should not twist round each other
- *Type three* swings require a secondary bearing support mechanism **NB. This may be internal.**
- *Type four* swings should discourage children from jumping forwards, for example by seat design

DIMENSIONS

- Minimum ground clearance at rest: 350mm (400mm for *Type 3* and tyres)
- No maximum seat surface height but we recommend a maximum height of 635mm (from BS5696) pending any changes for both cradles and flat seats
- Distance between seat and frame: 20% of swing suspension + 200mm
- Distance between seats: 20% of the swing suspension + 300mm
- If tilted at an angle of 30° the upper edge of a cradle seat should be level with or behind the leading edge of the seat base unless impact requirements are met
- Pivot splay (separation distance) at crossbar: width between seat fixings + 5% of swing suspension length

SITING

- Swing sets for young children should be separated from those for older children and sited to avoid cross traffic

FREESPACE

- The free space is 500mm from seat centre line measured horizontally to the front and 1000mm either side with the seat at 60° to vertical.

N.B. In our opinion a barrier should be outside the loose-fill surfacing area

SURFACING REQUIREMENTS

Free height of fall

- FFH is calculated from the centre of the stationary seat surface at 60° (half swing suspension length + height of swing seat at rest)

Forward and Back

Different areas for synthetic and loose-fill surfaces in a box or pit

1. synthetic: 0.867 x length of suspension member + 1.75m
2. loose-fill: 0.867 x length of suspension member + 2.25m

SURFACING DISTANCES FOR SWINGS Minimum Surfacing Distance from Seat Centre to Edge

Length*	Synthetic	Loose-fill
1.5	3.05	3.55
1.6	3.14	3.64
1.7	3.22	3.72
1.8	3.31	3.81
1.9	3.40	3.90
2.0	3.48	3.98
2.1	3.57	4.07
2.2	3.66	4.16
2.3	3.74	4.24
2.4	3.83	4.33
2.5	3.91	4.42

*Length of suspension member (pivot to seat surface at 635mm from ground)

Side width Type 1 and Type 2:

- *Seat width no greater than 500mm:* 1.75m minimum (i.e. 875mm each way from seat centre – 50% each side from seat centre)
- *Seat width greater than 500mm:* 1.75m minimum + difference between seat width and 500mm (50% each side of seat centre)
- Areas for two seats in one bay may overlap providing the distance between seats is 20% of the swing suspension + 300mm

Side width Type 3

- Circular area with a radius equal to the *Forward and Backward* figure for Type 1 and 2 swings

Slides

These requirements do not apply to water, roller and multiple slides with mats etc.

DEFINITIONS

<i>Slide:</i>	a slope that contains and guides the user
<i>Embankment slide:</i>	a slide where the majority of the chute follows the land contours
<i>Attachment slide:</i>	a slide that has access from other items (i.e. a platform)
<i>Starting section:</i>	the section where the child gets onto the slide

SAFETY REQUIREMENTS

- *Free-standing slides:* the maximum vertical height which a stairway can reach without a change of direction is 2.5m
- Starting section at the top of each chute: length 350mm minimum, zero to 5° downwards at the centre line.
N.B. This can be a platform for attachment slides
- If the starting section is over 400mm long, platform requirements apply
- From a platform, the opening to the slide is the same width as the slide
- For attachment slides over 1m free fall height there should be starting section barriers which should have a height of at least 500mm at one point
- For attachment slides over 1m FFH there should be a guardrail across the entrance to the slide at a height of between 700-900mm
- Free standing slide starting section guardrails should be at least 700mm above the starting section at one point where FFH is over 1m
- Barriers extend to the top of attachment slides

SLIDING SECTION

- Maximum angle: 60° at any point and an average of 40°
- Angle changes over 15° should be radiused (curved). For the first 2m in height the radius is 450mm and for the remainder the radius is over 1000mm
- The width of open and straight slides over 1500mm long should be less than 700mm or greater than 950mm
- Spiral or curved slides should have a width less than 700mm

RUN-OUTS

- Run-outs of at least 300mm are required if the sliding section is under 1.5m long.
- Additional requirements:
 - Type 1: (DIN 7926 type slide)* Over 1.5m and under 7.5m: equal or greater than 500mm with a radiused end of 50mm
Over 7.5m: greater than 1500mm with a radiused end of 50mm
 - Type 2: (BS 5696 type slide)* (all lengths over 1.5m) run-out is .3m x sliding length
- Average angle of run-outs: (*Type 1*) 10° (*Type 2*) 5° (both downwards)
- Height of run-out: Less than 1.5m sliding length: maximum 200mm
Greater than 1.5m sliding length: maximum 350mm
- Users should come to a stop on the run-out section (*Type 2* only)

- Chutes should have a side height of:
 fall height up to: 1.2m: 100mm minimum
 1.2m - 2.5m: 150mm minimum
 Over 2.5m: 500mm minimum
- Maximum side angle from slide bed: 30⁰
- Tops of sides should be rounded or radiused to at least 3mm
- Tunnel slides should be a minimum 750mm high and 750mm wide (or circular with a minimum diameter of 750mm)
- Tunnels should start on or at the end of the starting section and be continuous over the sliding section but not over the run-out

FREE SPACE

1m radius centred on the mid-point of the slide.

N.B. The 'can' principle in *Diagram 1a* (Page 5) means that the can is held at right-angle to the surface and moved down to give the free space

SURFACING REQUIREMENTS

Normal distances except for the run-out should be:

- *Type 1*: 1m each side and 2m beyond
- *Type 2*: 1m each side and 1m beyond

Cable Runways

This refers only to wire cable systems and not to trackway systems.

DEFINITION

Traveller: the trolley and suspension mechanism holding the seat or handle

SAFETY REQUIREMENTS

- Stop at end should progressively slow down the traveller
 - Traveller should not be removable except with tools
 - No access to internal mechanism
 - Suspension mechanism should be flexible and exclude the risk of strangulation
- or**
- Be installed at least 2m above the ground at the middle of the cable
- Where children hang by the hands, the grip should not be enclosed (i.e. a loop)
 - Climbing should be discouraged onto the grip
 - Hand grips should comply to *grip* requirements (16 - 45mm)
 - Children should be able to get off the seat at any time (i.e. no loops or straps)
 - A tail may be provided under the seat for pulling the traveller back to the start but should present no risk of entrapment or strangulation
 - Maximum loaded (1 x 16 stone adult) speed is 7m per second

DIMENSIONS OF SUSPENSION MECHANISM

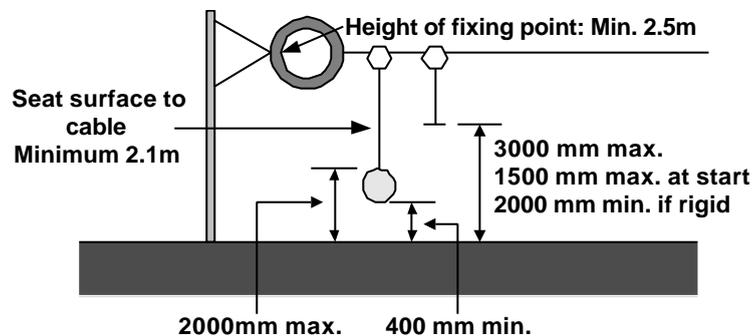


Diagram 9

FREE SPACE

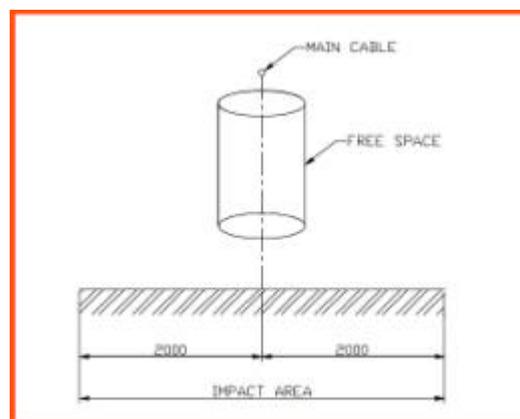


Diagram 10

- If two cables are placed parallel the minimum distance between them is 2m

IMPACT AREAS

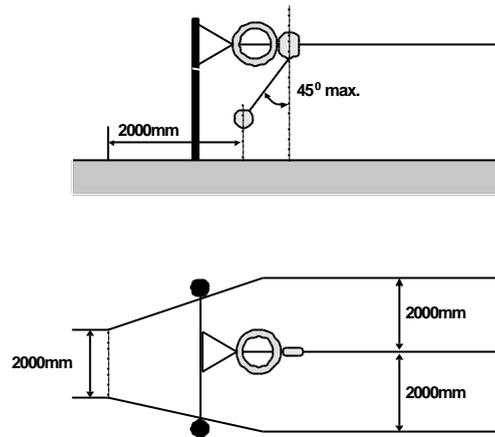


Diagram 11

- Suppliers must provide extra information (i.e. cable settings and permissible gradients) for this item in addition to the information detailed on Page 25

Rotating Items

A change in the clearance between the underside and the ground will affect older items. The change should provide greater safety.

DEFINITIONS

Items that rotate around a vertical axis or one inclined up to 5°

TYPES

Type A:	Rotating chair
Type B:	Traditional platform roundabout
Type C:	Overhead rotating item with hanging grips
Type D:	Track-driven roundabout
Type E:	Large revolving inclined discs

N.B. Rotating items under 500mm diameter are excluded.

SAFETY REQUIREMENTS

- Maximum free height of fall: 1000mm (For Type C: 1500 - 3000mm)
- Maximum speed at periphery under reasonable use: 5m per second. As no method is given, this cannot be tested to EN 1176. BSI are testing items by the test method in the former BS 5696 and issuing approval for conforming items. In our opinion such tests should be accepted.
- Hand grips should be between 16 - 45mm

SPECIFIC REQUIREMENTS

Type A: Maximum diameter: 2m
Ground clearance: 400mm minimum
Minimum of three seats, spaced equally
All components should be free from burrs and rounded with a minimum 5mm radius
Seats should conform to swing seat requirements for impact absorbency

Type B: Platforms should be circular and enclosed
All parts should revolve in the same direction
No super-structure over the edge of the platform
Mechanism should be enclosed
If set flush in ground, there should be a maximum 6mm gap between the edge and the ground
If not set flush:

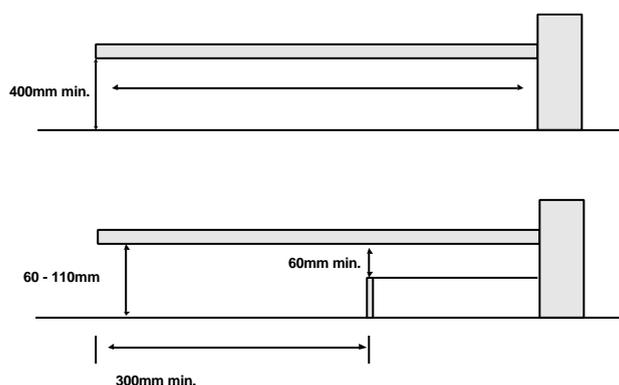


Diagram 12

- Protruding bolts underneath are covered by the protrusion requirements

Roundabouts with protective skirts

- Protective skirts should be of rigid material and have no burrs or other defects

- The bottom edge should be flared towards the inside or protected

Type C: Handgrips must be the same height and flexible
Fall height: between 1500mm - 3000mm from the handgrip

Type D: Pedals and cranks should free-wheel
All mechanisms should be enclosed
Any openings in the enclosure should be less than 5mm
Distance between crank arms and other components should be at least 12mm
No shear points

Type E: Clearance of underside at lowest point: 300mm
Maximum platform height: 1m
Free space: 3m
Upper surface should be continuous, smooth and with no handles or grips
Underside should be continuous, smooth and without any radial variations (i.e. spokes) or indentations

FREE SPACE

- Free space: Horizontal: 2m all round
Vertical head clearance from platform: sitting 1.5m
standing 1.8m
- Small rotating items under 500mm diameter are excluded but we suggest as for rocking items (1000mm between items at maximum movement)

SURFACING REQUIREMENTS

- There are no special extra requirements for surfacing areas
- Surfaces should be continuous underneath and level for at least 300mm

Rocking Equipment

DEFINITIONS

- Rocking equipment which can be moved by the user and is supported from below
- Damping*: any movement restricting device. **N.B.** Springs are treated as self-damping

TYPES

- Type 1*: Traditional single central pivot up and down seesaw
- Type 2a*: Typically a single spring rocker with main movement in one direction
- Type 2b*: Typically a single spring rocker moving in more than one direction
- Type 3a&b*: As 2a and 2b but with multi-springs
- Type 4*: A multi-pivot rocking item
- Type 5*: *Sweeping seesaw (with vertical and horizontal movement – i.e. a Mobilus)*
- Type 6*: *Overhead single-axis seesaw (i.e. rocking beam with hanging seats)*

SAFETY REQUIREMENTS

Type	Max. free fall height	Max. slope of seat/stand	Max. seat/stand height	Ground clearance ⁽¹⁾	Foot rests	Hand grips
1a	1500mm	20 ⁰	1000mm	230mm min.	Optional	Required
1b	1000mm	20 ⁰	500mm	230mm min.*	Not required	
2a	1000mm	30 ⁰	550mm	Optional	Required	Required
2b	1000mm	30 ⁰	780mm	230mm min.	Optional	
3a	1000mm	30 ⁰	550mm	Optional	Required	Required
3b	1000mm	30 ⁰	780mm	230mm min.	Optional	
4	1500mm	20 ⁰	1000mm	230mm min.	Required	Required
5	2000mm		1000mm	230mm min.	Not required	
4	1500mm		1000mm	230mm min.	Not required	

⁽¹⁾ Ground clearance not required when there is damping or motion is mainly in a horizontal direction

- Throughout the range of movement gaps in all accessible joints should be under 12mm
- Progressive restraint at extremity of movement is required (not spring rockers)
- Foot rests should be provided where the ground clearance is less than 230mm
- Hand grips should be provided for each seat or standing position
- Foot rests and hand grips should be firmly fixed and non-rotating
- Peg-type grips should have a ball or similar of 15cm² area (if circular the diameter over 22mm min)**
- Hand grip diameter: 16 - 45mm (for toddler items: 30mm maximum)
- Right-angled corners on moving equipment should be 20mm radius minimum (i.e. a bird's beak)
- Seesaws
 - Type 1*: maximum horizontal movement: 140mm
 - Type 3a*: maximum sideways movement: 5⁰
 - Type 4*: maximum horizontal movement: 600mm

FALLING SPACE

- 1000mm between items at maximum movement.
- NB.** A risk assessment suggests 1.25m might be more suitable

SURFACING REQUIREMENTS

There are no special extra requirements for surfacing areas. We suggest 1m minimum if under 60mm

NB. A risk assessment suggests larger spring items should have 1.5m

Surfacing

Surfacing meeting the former SI readings (BS7188) will pass the HIC requirements. A variety of materials are allowed, for example, rubber tiles, mats, wet-pour, loose-fills, grass re-inforcement mats etc. Others may be developed

DEFINITIONS

- Free height of fall:** Distance from the clearly intended body support or a position that may easily be reached to the impact area
- Type of use:**
Standing (from foot support to surface below)
Sitting (seat to surface below)
Hanging (hand support height to surface below)
Climbing: (when body support is a combination of feet and hands, i.e. a firepole)
N.B. Climbing items should not give access to a free fall height of over 3m.
- Impact area:** The area which can be hit by the falling user

INFORMATION

Surfacing suppliers must supply:

1. correct installation instructions
2. maintenance instructions
3. inspection procedures

SAFETY REQUIREMENTS

- Surfacing should have no sharp edges or protrusions (BSI Guidance note due)
- Surfacing should have no entrapments
- Loose fills should be 200mm more than the depth required to meet the HIC reading (normally 300mm)
- Hard surfaces should only be used outside the impact area
- Impact absorbing surfaces should be used where falls over 600mm are possible
- Topsoil or turf may be used up to 1m
N.B. This relies on a good sward with a suitable root structure. Where these are not present some soil conditions may present an unacceptable risk.
- No area requirement under 600mm. We suggest 1m. minimum

Test methods may be found in BS EN 1177

DIMENSIONS OF IMPACT AREA (NOT APPLICABLE FOR SWINGS AND CABLE RUNWAYS)

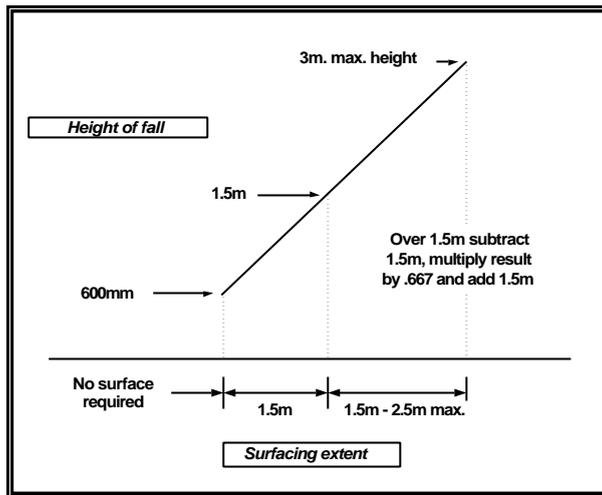


Diagram 13

Examples of how this works are:

Fall height	Surface distance	Fall height	Surface distance
1.5m	1.50m	2.3m	2.03m
1.6m	1.56m	2.4m	2.10m
1.7m	1.63m	2.5m	2.16m
1.8m	1.70m	2.6m	2.23m
1.9m	1.76m	2.7m	2.30m
2.0m	1.83m	2.8m	2.37m
2.1m	1.90m	2.9m	2.43m
2.2m	1.96m	3.0m	2.50m

Loose-fill materials have different requirements:

Material	Description	Min. depth	Max. fall height
Bark	20 - 80 mm Particles	300mm	3000mm
Wood chip	5 - 30 mm Particles	300mm	3000mm
Sand	0.2 - 2 mm Particles	300mm	3000mm
Gravel	2 - 8 mm Particles	300mm	3000mm
Other materials are permitted but have no specification providing they meet the HIC tests			

Installation, Inspection, Maintenance and Operation

Part 7 is guidance rather than a requirement (other than the supplier's documentation). In the UK a risk assessment must be carried out on all playgrounds (see *The Management of Health and Safety at Work Regulations 1992*).

SAFETY

- Appropriate safety systems must be established by the operator
- No access should be allowed to unsafe equipment or areas (+ signage in UK)
- Records should be kept by the playground operator
- Effectiveness of safety measures should be assessed annually (a risk assessment and annual inspection)
- Signs should give owner details and emergency service contact points
- Entrances for emergency services should be freely accessible
- Information on accidents should be kept (*The Play Inspection Company (ILAM) has a suitable form*)
- Staff and users should be safe during maintenance operations

INSTALLATION

- Equipment should be installed safely and to the manufacturer's instructions.

FOUNDATIONS

- Should not present a hazard
- In loose-fill surfaces, foundations should be 400mm below the surface or, if tapered for water shedding, 200mm or, be covered by the equipment. There are no specific requirements for synthetic surfaces. (*Diagram 14*)

INSPECTION

Manufacturers will recommend the inspection frequency although high-vandalism or high-use sites may need a daily check

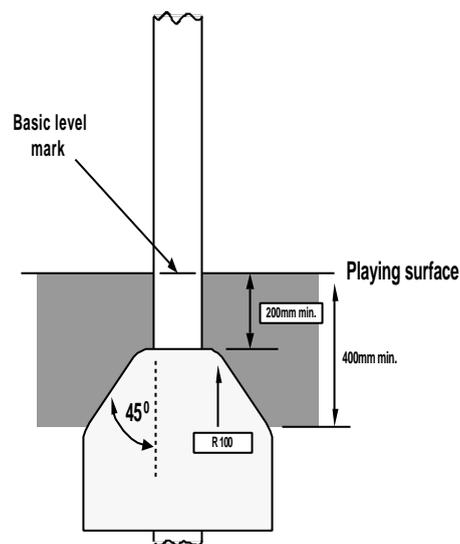
Routine visual inspections: identification of hazards from vandalism, use or weather conditions **(We recommend a recorded daily or weekly inspection according to the risk assessment)**

Operational inspection: every 1-3 months or as recommended. Checks operation, stability, wear etc.

Annual main inspection: checks long-term levels of safety and systems.

NB. In the UK this inspection should be carried out by an Inspector qualified by the Register of Play Inspectors International (see <http://www.playinspectors.co.uk> Examinations are also available for staff carrying out the Regular and Operational Inspections)

- An inspection schedule should be prepared for each playground, listing components and methods
- Appropriate action should be taken if defects are noted



STAFF

- Competence of personnel should be appropriate to the task
- Training is necessary
- Adequate information about equipment and about their responsibilities should be given to staff
- Specialised tasks should be carried out by qualified people (for example, welding)

DOCUMENTATION

Playground records should include:

1. certificates of tests or compliance with standards
2. inspection and maintenance instructions
3. operating instructions from the supplier
4. operator's own inspection and maintenance recommendations
5. design and tender documents

ROUTINE MAINTENANCE

- Basic routine maintenance details should be supplied by the manufacturer and include security of fixings, painting and staining, surfacing maintenance, lubrication, cleansing

CORRECTIVE MAINTENANCE

- This covers remedial work and repairs as required
- Alterations should only be carried out after consultation and agreement with the supplier or a competent person

Product Information

The supplier has to supply a range of product information in clear, simple, legible English. This is a requirement of the standard

INFORMATION

Information should include details of:

1. free space
2. surfacing requirements
3. dimensions of largest part
4. mass of heaviest part (in kg.)
5. intended age range
6. availability of spare parts
7. standard compliance
8. if the equipment is intended for indoor or supervised use only
9. delivery parts list
10. full installation instructions
11. post-installation instructions
12. run-in period instructions
13. inspection and maintenance instructions
14. servicing instructions
15. details of any special disposal requirements
16. spare part numbers

N.B. Under UK legislation new equipment should be risk assessed on site by the purchaser or operator

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