WICKSTEED playscapes

the play inspection company

An Essential Guide to BS EN 1176 and BS EN 1177

Children's Playground Equipment & Surfacing: updated for 2008

www.playinspections.co.uk
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An Essential Guide to BS EN 1176 and BS EN 1177

Abbreviations:

CFH	Critical fall height
FFH	Free fall height
BSI	British Standards Institute
SI	Severity Index

The interpretations are those of 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 and may be contacted through BSI.

The Play Inspection Company and Wicksteed Playscapes

The Play Inspection Company

The Play Inspection Company was formed by four leading individuals In the Play Industry to provide a professional service covering all aspects of play. We aim to ensure children enjoy themselves, grow and develop through their play and, at the same time, assure providers face reduced injury claims and litigation.

Keith Dalton has over 20 years experience in the playground industry. He was Managing Director of Hags Play Ltd for over 10 years, and was also responsible for the development of the BTEC Level 3 Advanced Award in Playground Inspection & Operation, being one of the only 2 approved tutors for this course in the UK.

Safety Surfacing is an area of many myths; Keith is one of the most knowledgeable people around the industry with regard to the different types and properties of impact absorbing surfaces.

Keith was also responsible for the production of the DDA Assessment check-list that now forms the industry standard. In May 2003 Keith enrolled with the Register of Play Inspectors International (RPII) and is one of a select group who are qualified to examine all levels of inspectors enrolling with the RPII.

Peter Heseltine has been involved in children's play provision for over 35 years and has written numerous publications including:

Review of Playground and Related Surveys • Playing Safe Playground Safety Checklist • Playground Design for Local Communities • The Children's Playground • Guide to BS1176 and 1177 • Assessing Risk on Children's Playgrounds

Peter has been working independently providing training and inspection services to the industry and for three years with The Play Inspection Company.

Wicksteed

As the largest and longest established playground equipment manufacturer in the UK, Wicksteed takes on the responsibility of ensuring the safety of children is given high priority in the playground industry.

As long ago as 1959 our playground equipment of the time carried the British Standard Kitemark to BS 3178. The Safety Standard evolved from BS 3178 to BS 5696 in 1979 and subsequently in 1998 BS EN 1176 and BS EN 1177 became the European Safety Standard for playground equipment and impact absorbing playground surfacing.

Wicksteed has always been heavily involved in the formulation of the Safety Standards of the day and we represent the UK playground equipment manufacturers on the European Standards Committee.

Our Technical Manager - Rob Davies, has co-written this publication and it has been our pleasure to sponsor the document to ensure everyone affected by the 2008 changes to BS EN 1176/77 are kept up to date and fully informed.

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 and some non-EU countries.

BS EN 1176
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 and test methods for spatial networks
Part 10:	Fully Enclosed Play Equipment is outside the scope of this document

BS EN 1177
Impact Attenuating Playground Surfacing
Determination of Critical Fall Height

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

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.** Where additional information is felt to be helpful these are included as Author's Notes.

The Standard recognises the developmental importance of play and risk. It is felt that children need to experience risk and the Standard is designed to prevent injuries with a disabling or fatal result or where a child may receive an injury in the event of an incorrect judgement on their part. It cannot remove all possibility of injury. Parental or care-giver supervision is seen as crucial in reducing injuries to very young children. Increased accessibility for children with disabilities has been borne in mind to provide a balance between safety and challenge.

BS EN 1177 solely concerns the testing of impact absorbing surfaces. All other requirements and recommendations have been 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, DIN 7926 (the German standard) and NF S54201 (the French Standard).

BS EN 1176 is not retrospective or, currently, as with previous standards, a legal requirement in the UK but represents 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 as part of a risk assessment.
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.html

BS 5696, DIN 7926, NFS54201 and part of **BS 7188** have been withdrawn. Equipment produced before **BS EN 1176** (January1, 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, DIN 7926** or the earlier version of **BS EN 1176** have not suddenly become dangerous the day after publication of this new BS EN 1176. In the UK manufacturers will have twelve months from the date of publication to achieve conformity.

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. Commonsense and risk assessment will remain a good guide.

Ancillary items

ISO/IECC 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, 11 of the Standard. Where they are not covered by these additional requirements, SC1 (the responsible European committee) should meet the relevant requirements of part 1. Like all equipment they should then be subject to a risk assessment in the UK. A TÜV certificate or Kitemark 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. It does not include staffed & enclosed adventure playgrounds although its general principles are a useful guide. Although not stated we believe this refers to permanently fixed equipment only - equipment produced for the home is not covered by this Standard (BS EN 71 & the Toy Directive apply). It does not include soft-play areas, skateboard areas or ancillary items,such as fences, seats, litterbins etc. European standards for fully enclosed play equipment, wheeled sports & multi-use games have been published
- **Climbing equipment:** items on which children cannot stand unaided but must hold on, requiring three points of contact unless moving
- **Playing surface:** the ground
- **Forced movement:** a movement to which a child is committed by the design of the equipment (ie. a swing, slide or fire man's pole)
- **Free space:** the space which children are forced to use by the action of the equipment (ie. slide chute or fire man'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
- **Collective use:** use by more than one user at a time
- **Ladders, stairs and ramps:** means of access or egress, the difference between them being detailed on Page 10
- **Impact area:** the area where the child will strike the surface or another item or part of equipment (*see Section on Surfacing pg 16*)
- **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
- **Easily accessible:** protection against falling is required where there are ladders, stairs, ramps or tiered platforms (less than 600mm height difference) which fail to allow time for the intervention of a parent or care-giver.

Definitions cont..

- **Cluster:** separate items designed to be grouped together (i.e adventure trails). **NB.** 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.
- **Steep play element:** a play feature steeper than 45º to enter or leave equipment

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 BS EN 1176

Minimum space around equipment and zones

The minimum space around equipment is made up of three elements:

1. space occupied by equipment
2. free space (only applies where there is 'forced' movement and this distance should be stated by the supplier)
3. 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 1)
- The measurements for the free space are:

Standing A: **1000mm** B: **1800mm**
Sitting A: **1000mm** B: **1500mm**
Hanging A: **500mm** B: **300mm** above the hanging position and **1800mm** below

- Some equipment may have different distances set by the supplier

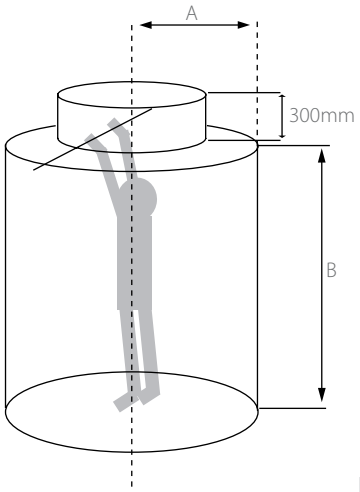


Diagram 1

Protection against injuries in the free space

- No obstacles in the free space (other than structures to assist, support or safeguard the user, for example, platforms with fire poles or hand-rails)
- Clearance between pole and take-off platform: **350mm** minimum
- Fire poles should meet grip requirements
- 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 (Page 16)
- Platforms with fall heights of more than 1m between them require testable impact absorbency

Protection against injuries due to other types of movement

No unexpected obstacles (Diagram 2)

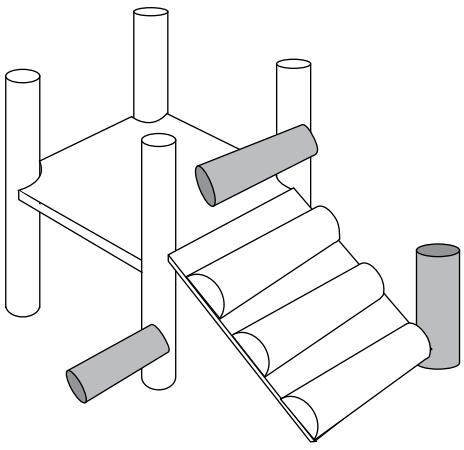


Diagram 2

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 and EN 351-2.
  No coal-tar oils (i.e. creosote). CCA should not be used.
  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

Author's note: *Incompatible metals may cause corrosion*

- **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:** such materials must not be used where children can access them

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:** permitted diameter: max. diameter **60mm**

Finishing

- Timber species and synthetics should be splinter resistant
- No protrusions or sharp edge components (ie. Protruding nails)
- Bolts should conform to Diagram 3
- Welds should be ground 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 should resist removal

Author's note: *The term 'resist removal' is our interpretation of the intention of the Standard. 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, climbing ropes, chains and nets.

Fibre ropes

- Conform to EN ISO 9954 or EN ISO 2307 or have a material and load certificate
- Ropes used by hands shall have a soft, non-slip covering

Wire ropes

- Unstressed 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

Author's note: *In practice, the rope only needs be 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 (fixed at one end)

- 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**
- Ropes should not form loops

Climbing ropes

- Anchored at both ends
- Probe C should be capable of insertion through any possible loop
- Single climbing rope diameter: **18 - 45mm**
- Nets should meet grip requirements

Heavy suspended beams

Items such as tree trunks or planks over 25 kg:

- Ground clearance **400mm** minimum at all times
- Changes in profile: **50mm** minimum radius
- Movement should be less than **100mm**

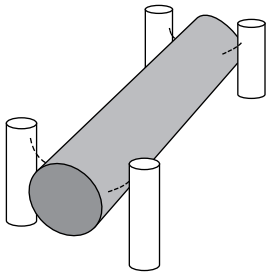


Diagram 3

Entrapments

DEFINITIONS
- **Entrapment:** a place from where 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 the periphery of which is unbroken
- **Non-bound opening:** an opening with three sides (i.e. a space between a platform and two verticals)

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

There are six probes: the **Torso Probe** (C), **the Large Head Probe** (D), **the Wedge Probe** and **the two Finger Probes**. A new probe (E) tests bound flexible openings. The tests for children under three have been removed. There is also a toggle test to reduce the dangers of clothing and toggles being caught and a ring gauge for use on rocking rquipment only. Full details of the test methods may be found in the Standard. Dimensions are given on the inside back cover.

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

Tests for all children (rigid or flexible openings)

- All cases: if the torso probe (C or E) enters then the large head probe (D) must also pass through to its full depth, not including the handle
- The probes are not rotated and the taper should be ignored
- If the C or E probes fails to enter to its full depth, there is no entrapment
- If Probe E is used on a flexible bound opening a pull of 20k is required to assess the opening where entrapment is suspected.

Author's note: *Steel cored rope will stretch in use, particularly when new. Re-testing may be advisable.*

Wedge entrapments

The basic test is: If Portion B can be inserted level or to an angle of up to 45º to a greater depth than the thickness (**45mm**) then Portion A should touch the bottom without touching the sides.

Angles between 45º and 90º have a second test: If Portion A can be inserted to less than Portion B1 it passes.

Toggle tests

This is to assess whether clothing can be trapped and is used only where there is freespace. There are tests for slides, fire poles and accessible roof ridges. This does not refer solely to anorak-type toggles.

NB. The chain length has been decreased & the stand base has a size.

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 the pole at both sides of chute surface. The test is applied for the whole chute length and height of the test pole.

Fire 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 **1.8m** 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 test for entrapment.

Non-rigid members (ie. ropes and chains)

- Overlapping must not create an entrapment

Bridges

- The space between the flexible bridge and rigid sides should be not less than **230mm**
  See Diagram 4

Author's note: *Wire rope will stretch in use and may lead to an entrapment*

Entrapment of the whole body

This may occur in tunnels (not tube slides)

1. if tunnels are open at one end only they should:
   - slope less than 5º
   - be sloped upwards on entry
   - have an internal diameter over **750mm**
   - be less than **2m** long
2. if open both ends
   - slope less than 15º
   - 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 15º
   - have an internal diameter over **750mm** with no length limit
   - have provision for internal climbing (e.g. steps or handles)
3. 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 45º should have no gaps over 30mm in the direction of movement.

(There are no requirements for suspension bridge gaps other than the main entrapment requirements)

Entrapments

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 any 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 5 shows entrapment distances

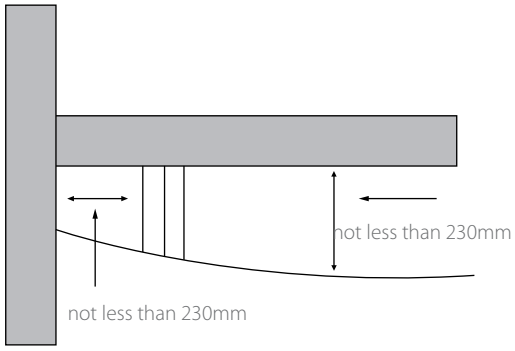


Diagram 4

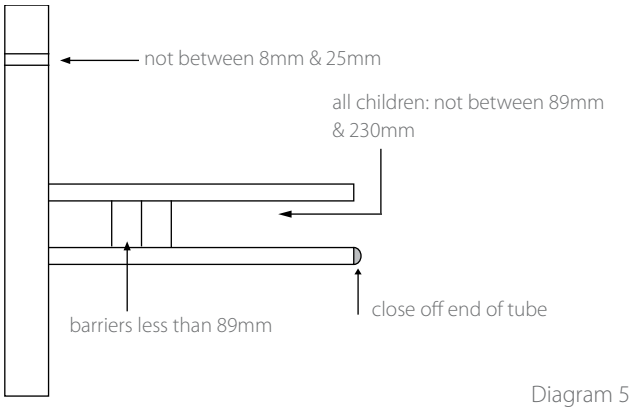


Diagram 5

Handrails, guardrails and barriers

DEFINITIONS
- **Handrail:** a rail to help the child balance
- **Guardrail:** a rail to prevent children falling
- **Barrier:** a guardrail with non - accessible infill

Handrails
Where required they should be between **600mm** and **850mm** above the foot position.

Guardrails and barriers
- Platforms up to **600mm** - no barriers required + impact absorbing surface over **600mm** (can be grass up to 1.5m (but see note on grass in *Surfacing* Section p16)
- Equipment over **600mm** requires a **600 – 850mm** barrier

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

Open sided platforms
- At the access and exit openings to play items from a platform (i.e. a fire pole) the space in the barrier shall be **500mm**, unless there is a guardrail
- Width for stairs, ramps and bridges should be the same as the access item
- For play elements with an inclination over 45º which are not easily accessible (e.g. a scramble net) the opening is **1200mm** max.
- Steep play elements (over 45º) should have **500mm** maximum openings and platforms under **2m** high

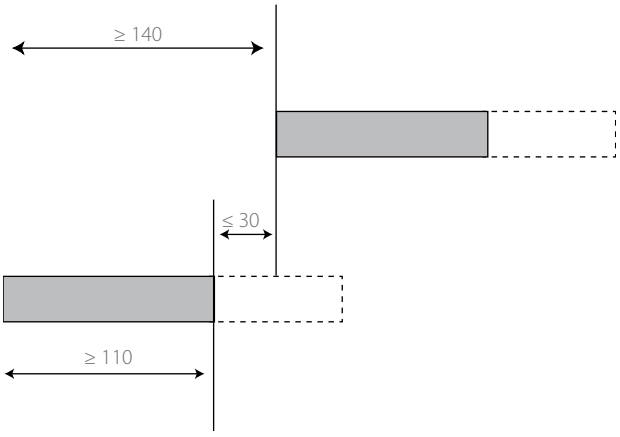


Diagram 6

Means of access

Probes should be applied to all accesses. All means of access should have no entrapments; be securely fixed; be level to ± 3º (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
Ladders should:
1. have rungs and/or sides up to **60mm** diameter (grasp) or have handrails **16 - 45mm** (grip).
- Near vertical ladders i.e. within 10º: apply grip requirements to the rungs.
  Rungs require grip and sides require grasp
2. be evenly spaced (not between top rung and platform and bottom rung and ground)
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 90º to the ladder
- Ladder sides may be higher than the platform

Stairs
Stairs should:
1. have at least three risers
2. be evenly spaced
3. have a minimum tread depth of **110mm**
4. A **30mm** maximum gap between tread front and next tread back (See diagram 6)

- 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 90º or be off-set (no off-set on free-standing slides up to 2.5m)
- Guardrails and barriers should have **600mm** high handrails from the first step and meet grasp requirements
- Barriers are required above **600mm**
- Guardrails should be provided from the first step
- Guardrails and barriers should meet grasp requirements and handrail requirements

Ramps
(inclined surfaces up to 38º from the horizontal with a constant angle)
Ramps should:
1. have slip-resistant measures if accessible to all ages i.e. footholds
- Guardrails and barriers should have **600mm** high handrails from the first step and meet grasp requirements
- Barriers are required above **600mm**
- Guardrails should be provided from the first step
- Guardrails and barriers should meet grasp requirements and handrail requirements

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 ground

Types

Type 1: Traditional classic swing
Type 2: Swing with restricted movement
Type 3: Single point swing
Type 4: Contact (Hexagonal) swings

Requirements

- No all rigid suspension members (i.e. solid bar top to bottom)
- Design for Type one, two and four swings should be principally for use by seated children and Type three by standing children
- Two seats per bay maximum
- Cradle & flat swing should not be mixed in the same bay

Author's note: *When only one bay with two swings is provided, the seats may be mixed, provided an appropriate Risk Assessment has been undertaken.*

- Cradles should be designed so children do not slip through the frame
- 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 jumping forwards, for example, by seat design

Dimensions

- Minimum ground clearance at rest: **350mm** (**400mm** for Type 3 and tyre seats)
- No maximum seat to surface height

Author's note: *We recommend a maximum height of 635mm (from BS 5696) for both cradle 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 30º 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
- Enclosures should be at least 1.5m from the swing seat edge

Freespace

- The free space is **500mm** from seat centre line measured horizontally to the front and 1000mm either side with the seat at 60º to vertical
- For synthetic surfaces barriers or other obstacles must be **500mm** from the surfacing area in the main direction of movement

Surfacing requirements

Free height of fall

- FFH is calculated from the centre of the stationary seat surface at 60º (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)*

Surfacing Side width Type 1, Type 2 and Type 4

- **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

Surfacing 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

- **Slide:** a slope that contains and guides the user
- **Embankment slide:** a slide where the majority of the chute follows the land contours
- **Attachment slide:** a slide that has access from other items (i.e. a platform)
- **Starting section:** the section where the child gets onto the slide
- **Sliding section:** where there is forced movement
- **Run-out:** section where the speed is reduced
- **Guarding section:** protection against falls from the starting section

Safety requirements

- Free-standing slides: the maximum vertical height which a stairway can reach without a 90º change of direction is **2.5m**
- Starting section at the top of each chute: length **350mm** minimum, zero to 5º downwards at the centre line.
  NB. This can be the platform for attachment slides
- If the starting section is over **400mm** long, barrier requirements apply
- From a platform, the opening to the slide is the same width as the starting or guarding section
- For attachment slides over **1m** free fall height there should be a guarding section if the starting section protrudes beyond the platform with 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 **600 - 900mm**
- Free standing slide starting section should have a guarding section equivalent to barrier requirements
- On free-standing slides over **2m** easily accessible requirements apply

Sliding section

- Maximum angle: 60º at any point and an average overall of 40º
- Angle changes over 15º 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**
- Jointed slides should not allow entry of sharp objects between sections.

Author's note: *One piece slides are preferred*

Run-outs

- Run-outs of at least **300mm** are required if the sliding section is under **1.5m** long.

Additional requirements if over 1.5m long:

Type 1: *Short run-out 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: *Long run-out slide* (all lengths over 1.5m)
The run-out is a minimum of .3 x sliding length

- Average angle of run-outs:
  Type 1: 10º **Type 2:** 5º (both downwards)
- Height of run-out:
  Less than 1.5m sliding length: maximum **200mm**
  Greater than 1.5m sliding length: maximum **350mm**
  There is no minimum run-out height
- 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: 30º
- Tops of sides should be rounded or radiused to at least **3mm**

Tunnel slides

- 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.
  NB. The can principle in Diagram 1(Page 6) means that the can is held at right-angle to the surface and moved down to give the free space

- Multi-track slides may overlap their free-spaces

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.

DEFINITIONS
- **Traveller:** the trolley and suspension mechanism holding the seat or handle

Safety requirements

- Stop at end or angle of cable should progressively slow down the traveller
- Angle of swing should be less than 45º
- 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 when loaded

- 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

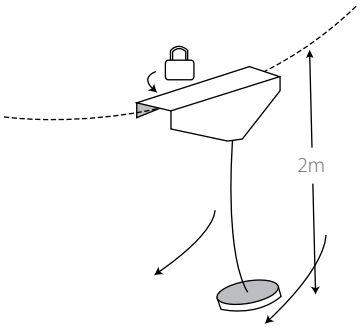


Diagram 7

Free space

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

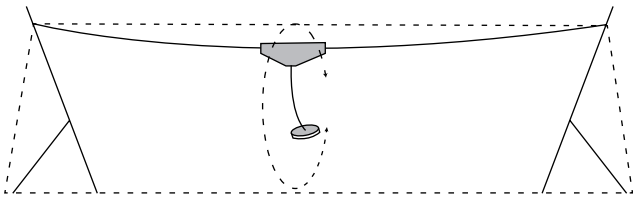


Diagram 8

Impact areas

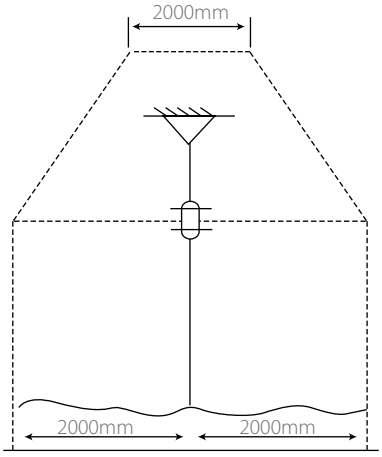


Diagram 9

- Suppliers must provide extra information (i.e. cable settings and permissible gradients) for this item in addition to the information detailed on Page 18.

Spatial networks

The requiremewnts are:

- There should be no straight path through the structure with a diameter greater than **650mm**
- If this exists the surface must meet the CFH requirements of the highest point
- For horizontal nets the mesh size should be less than **420mm** diameter
- The FFH is from the highest point of direct fall to the surface beneath

Rotating Items

DEFINITIONS
- Items that rotate around a vertical axis or one inclined up to 5º

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

NB. Rotating items under 500mm diameter are excluded.

Safety requirements

- Maximum free height of fall: **1000mm** (For Type C: **1500 - 3000mm**)
- Maximum speed at periphery of mechanically driven roundabouts under reasonable use: **5m** per second. As no method is given, this cannot be tested to BS EN 1176. BSI are testing items by the test method in the former BS 5696 and issuing approval for conforming items.

Author's note: *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 and a vertical difference (trip hazard) of less than **20mm**
- If not set flush, ground clearance more than 400mm or **60 - 110mm** maintained for 300mm from edge (diagram 10).

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. There are further detailed requirements listed in the Standard.

Type C:
- Handgrips must be the same height and, if below **1.8m,** flexible
- Fall height: between **1500mm - 3000mm** from the handgrip
- Free space is **2m** when flexible handgrips are at 30º

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**
- The 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.

Author's note: *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 pivoted from below
- **Damping:** any movement restricting device.
  NB. 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- ie a Mobilus or Waltzer)
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	ground clearance
1	1500mm	20º	230mm min
2a	1000mm	30º	optional
2b	1000mm	30º	230mm min
3a	1000mm	30º	optional
3b	1000mm	30º	230mm min
4	1000mm	20º	230mm min
5	2000mm		230mm min
6	2000mm		230mm min

*Ground clearance not required when there is damping or motion mainly in a horizontal direction

- Throughout the range of movement gaps in all accessible parts of the suspension mechanism should not be less than **12mm**
- Progressive restraint at extremity of movement is required (not for spring rockers and not when damped)
- 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 & hand grips should be firmly fixed & non - rotating
- Peg-type grips should have a ball or similar of 15cm² area (If circular the diameter over **22mm** min.) Test with ring gauge - the grip should not protrude through the gauge
- 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)

Movement

Type 1:	maximum horizontal movement: **140mm**
Type 3a:	maximum sideways movement: 5º
Type 4:	maximum horizontal movement: **600mm**
Type 6:	free-fall height should not exceed **2m** when seat angle is at 20º

Falling space

- **1000mm** between items at maximum movement

Author's Note *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 **600mm**.

Author's note: *A risk assessment suggests larger spring items should have **1.5m.***

Surfacing

Surfacing meeting the former SI readings (BS 7188) 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. BS EN 1177 now refers only to methods of test. Other requirements are in Part 1 of BS EN 1176. BS 7188: **Impact Absorbing Playground Surfaces:** *Performance Requirements and Test Methods (Published 1998 and covers some aspects of surfaces not applicable outside the UK. Currently being revised)*

DEFINITIONS

- **Free height of fall:** Distance from the clearly intended body support or a position that may easily be reached to the impact area
- **Measurement from:**
  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. ie a firepole)
  NB. 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 projections
- Surfacing should have no entrapments
- Loose fills should be 100mm more than the depth required to meet the HIC reading
- Hard surfaces should only be used outside the impact area
- Tested impact absorbing surfaces should be used where falls over **600mm** or where forced movement is possible
- Under **600mm** CFH and no forced movement, tested IAS is not required, but some form of protective surface should be provided
- The use of topsoil or turf is left to each country (See note below)
- No area requirement under 600mm.

Author's note: *1m minimum is generally accepted as best practice.*

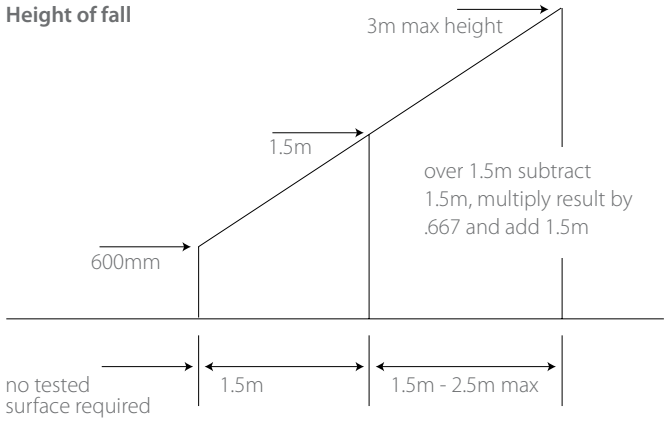
Use of grass

Grass may be used up to a fall height of 1.5m providing the risk assessment includes the following criteria:

- A depth test of 150mm indicates few stones or hard objects
- Areas of wear are strengthened
- The use of the grass surface is monitored
- A good sward is maintained

Dimensions of impact area

(not applicable for swings and cable runways)



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 - 80mm particles	200mm	3000mm
wood chip	5 - 30mm particles	200mm	3000mm
sand	0.2 - 2mm particles	200mm	3000mm
gravel	2 - 8mm particles	200mm	3000mm

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 of safety management 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 has a suitable form)
- Staff and users should be safe during maintenance operations
- Single post equipment requires special attention

Installation

- Equipment should be installed safely to appropriate national building regulations 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 10)

Inspection

A post-installation inspection should be carried out by an independent organisation such as the Play Inspection Company.

Manufacturers will recommend the inspection frequency although high-vandalism or high-use sites may need a more frequent 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, sealed for life parts etc.
Annual main inspection: checks long-term levels of safety

Author's note: *In the UK this inspection should be carried out by an inspector qualified by the Register of Play Inspectors International (see www.playinspectors.co.uk. Examinations are also available from the Play Inspection Company, for staff carrying out the Routine 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. The Play Inspection Company can advise.
- 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

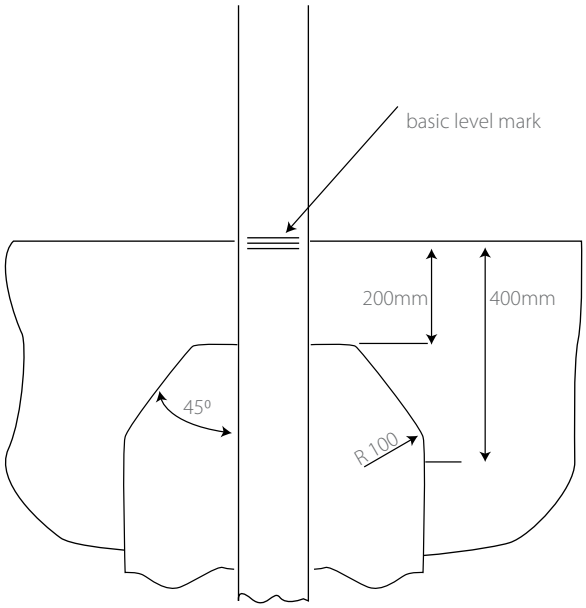


Diagram 10

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

Author's note: *In the UK the Management of Health and Safety at Work Regulations requires all new equipment to be risk assessed on site by the purchaser or operator . The supplier or post-installation inspection can assist with this.*

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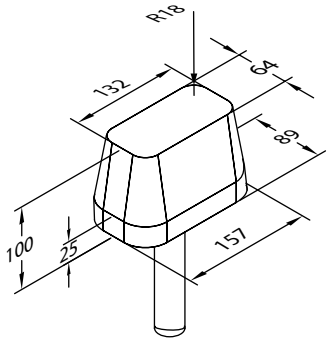
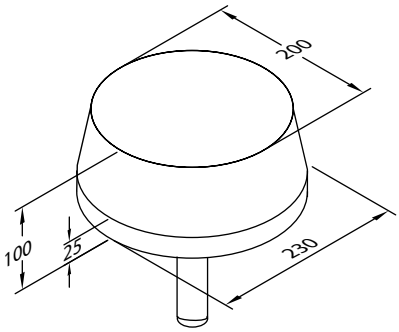
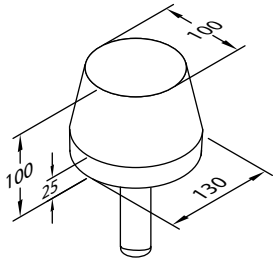
EN 1176 Probe Set



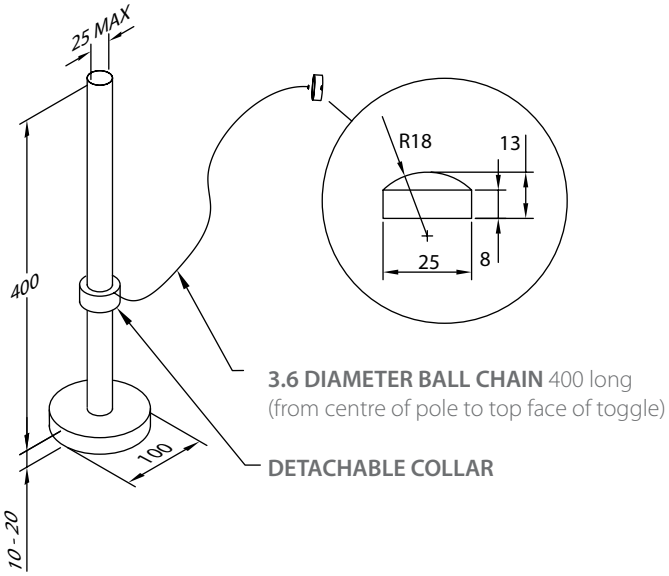
PROBE C TORSO



PROBE D LARGE HEAD

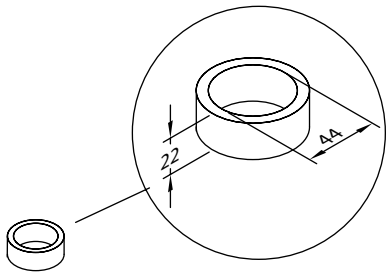


PROBE E

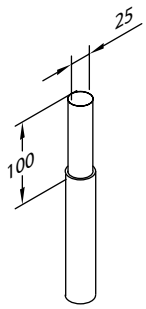


3.6 DIAMETER BALL CHAIN 400 long
(from centre of pole to top face of toggle)

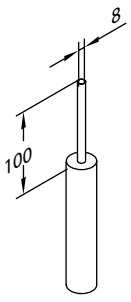
DETACHABLE COLLAR



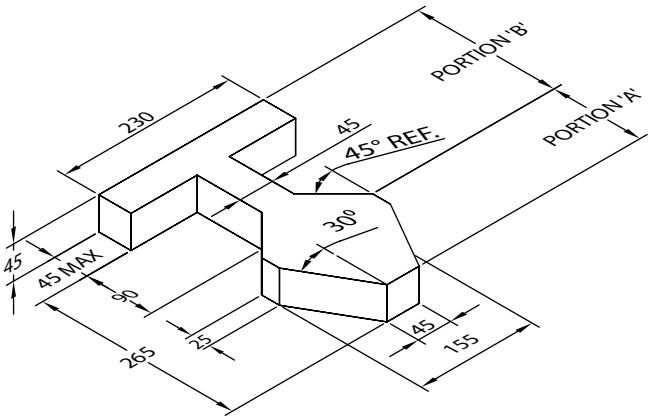
ROCKING EQUIPMENT RING GAUGE



25 DIAMETER FINGER ROD



8 DIAMETER FINGER ROD



HEAD AND NECK TEMPLATE

Please note: *the finger rods are hemispherical at the ends*

WICKSTEED playscapes

the play inspection company

An Essential Guide to BS EN 1176 and BS EN 1177

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