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the safest hands around playgrounds

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An Essential Guide to

EN 1176 and EN 1177

Children's Playground Equipment & Surfacing: updated for 2018

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"There is always a certain risk in being alive, and if you are more alive... there is more risk".

Ibsen

ABOUT US

Welcome to this Essential Guide to EN 1176 and EN 1177 Children's Playground Equipment & Surfacing.

Whether you manage play sites or manufacture play equipment, this booklet provides a comprehensive guide that will help keep you in line with the current safety standards and industry best practice for Children's Playground Equipment & Surfacing.

The Play Inspection Company

The Play Inspection Company - Playground safety consultants and inspectors. The Play Inspection Company was formed in 2004 by some of the most experienced and respected professionals in the play industry and is currently run by Directors and industry specialists Keith Dalton and Jon Dalton.

Our playground safety consultants, inspectors and mobile application developers offer a comprehensive service to ensure that your business, school or organisation can mitigate the potential risks associated with children's play areas and equipment.

Since its conception, the Play Inspection Company has rapidly grown in both size and reputation, with numerous additional experienced inspectors regularly joining our ranks in order to satisfy the increasing demand for our services.

Based in Dorset, we are very proud of our carefully selected team. Our playground safety consultants and field inspectors are distributed around the country so that we can easily deliver the most efficient and cost-effective national service in the industry.

The Register of Play Inspectors International (RPII)

The Register of Play Inspectors International (RPII) is the official UK body for the examining and accrediting of inspectors for indoor and outdoor play areas and for inflatables. The RPII also accredits courses for the training of inspectors to ensure that playground safety standards are met and adhered to for your complete peace of mind.

The Play Inspection Company actively encourages and supports the role of the RPII (Register of Play Inspectors International) both in the UK and Internationally. Company Directors Jon and Keith Dalton have been Board Members of the RPII for a number of years and represent the RPII on standards committees responsible for writing and revising the relevant standards.

Ensuring play safety is essential - both for the protection of the children using the equipment and to mitigate risk for the councils, schools and organisations in charge of these play areas. By using accredited playground inspectors, providers can be sure that they meet the strict criteria set by the RPII and that they have been fully trained to conduct inspections to the required levels of competence.

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“Quality and Safety is at the heart of everything we do and we’re dedicated to supporting and educating our customers on these important subjects. We’ve teamed up with The Play Inspection Company to develop this essential guide, to help buyers, specifiers and operators keep in line with current safety standards and industry best practice for Children’s Playground Equipment and Surfacing”

Mark Grace, Managing Director

HAGS

HAGS is one of the largest manufacturers of recreational products, providing play, sports & fitness, and park & urban equipment around the world. Our goal is to be the recreational provider of choice by having the highest level of quality and value when it comes to products, service and pricing. Our commitment is to serve our customers and help them on their journey to build the best recreational areas possible and to inspire all generations.

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INTRODUCTION

EN 1176 was originally published on January 1, 1999. At that time it was a landmark publication, being applicable throughout the European Union as well as in some non-EU countries and replacing all individual country National standards that had been in force to that point.

Since then the standard was fully revised in 2008; a further revision of Parts 1, 2, 3, 4 & 6 was published at the end of 2017. Over the life of the standard, its core principles have remained consistent and have been universally adopted. Part 5 is currently completing its revision cycle and is likely to be published in 2018/19. Part 10 is also being revised with a likely publication date of 2020. The revised EN 1177:2017 will also be published at the beginning of 2018.

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 10:
Fully Enclosed Play Equipment is outside the scope of this document.

Part 11:
Additional specific safety requirements and test methods for spatial networks.

As well as these published Standard parts a number of Technical Reports have also been published in recent years to supplement the requirements.

TR 16396:2012: Playground equipment for children - Replies to requests for interpretation of EN 1176:2008 and its parts.

TR 16467:2013: Playground equipment accessible to all children.

TR 16598:2014: Collection of rationales for EN 1176 - Requirements.

TR 16879:2016: Siting of Playground and other recreational facilities - Advice on methods for positioning and separation

TR 17207: 2018: Framework for the competence of playground inspectors (this Technical report is currently awaiting publication, estimated April 2018)

EN 1177

Impact Attenuating Playground Surfacing Determination of Critical Fall Height. EN 1177 solely concerns the testing of impact absorbing surfaces. All other surfacing requirements and recommendations are contained in EN 1176.

BS 7188

Impact Absorbing Playground Surfaces: Performance Requirements and Test Methods. Although not published in the rest of Europe this provides some long established, additional performance tests for synthetic surfacing products supplied in the UK (first published 1989, then revised in 1998 and 2009).

Notes:

The notes in the following sections summarise the main requirements of the standard for the interested layperson, 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 believed to be helpful these have been included as Author's Notes.

The Standard recognises the developmental importance of play and risk and this is expected to be further reinforced in TR 17207, competence of inspectors. It is understood that children need to experience risk; the Standard helps promote this by acknowledging that playing may lead to bumps and bruises and even the occasional broken limb. The aim of the standard is first and foremost to prevent injuries with a disabling or fatal consequence. Parental or care-giver supervision is seen as crucial for reducing injuries to very young children. Inclusive play opportunities for children with disabilities have been considered in order to provide a balance between safety and challenge.

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Risk/Benefit Assessment:

The principles of safety management are applicable to both the workplace and play provision, however the balance between safety and the provision of beneficial risk is likely to vary between the two different environments. In play provision exposure to some degree of risk may be of benefit because it satisfies a basic human need and gives children the chance to learn about risk and consequences in a controlled environment; this principle holds for all facilities that offer opportunities for user development. It is important to ensure that a distinction is made between 'good' risks that provide these developmental opportunities and 'bad' risks, which do not. Good risks should be clear and foreseeable to the user, so that they can make an assessment as to whether they should attempt to engage with the challenge that is being offered; bad risks on the other hand are often not easy for the user to assess, and the benefit offered is limited. Playground equipment and other installations/installed products within the playground shall be properly maintained to reduce the risk for accidents. The process of a Risk/Benefit Assessment (RBA) provides a tool for identifying whether a risk is good or bad to ensure that any controls are appropriately applied, and that a priority is established where more than one issue is identified.

LEGAL BACKGROUND

EN 1176 is not retrospective or a legal requirement in the UK, but represents good practice in the event of an accident claim.

The limitations of EN 1176 should be recognised, as mere compliance with the Standard will not automatically mean that a playground is safe or provide immunity from legal proceedings; as with previous playground standards they are intended to be used intelligently as part of a risk assessment. This assessment should always consider the wider developmental benefits that a play environment provides. The Health and Safety Executive issued a High Level Statement in 2012: Children's Play & Leisure – Promoting a Balanced Approach. This document is still current and provides a basis for the HSE position concerning play.

http://www.hse.gov.uk/entertainment/childrens-play-july-2012.pdf

Equipment produced before the publication of **EN 1176** (January 1, 1999) should have met **BS 5696** or **DIN 7926** or have undergone third party testing and been subject to a risk assessment in the UK. The current version of EN 1176 was published in 2017, and as such there is a whole range of standards that equipment currently in use was designed to meet.

Where there are differences between the new and old standards, our advice is to carry out a risk assessment. Equipment that has been deemed perfectly safe under BS 5696, DIN 7926 or the earlier versions of EN 1176 have not suddenly become dangerous the day after the publication of this latest version of EN 1176, or its subsequent revisions.

New equipment should meet the requirements of the latest version of EN 1176; an independent third party certification from an accredited test laboratory will provide the best assurance. As will become apparent, some elements of EN 1176 are open to interpretation, therefore 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.

Extracts from the National Foreword of EN 1176:2017 Part 1

A number of new products are appearing on the market that are not specifically covered by the types of products found in the standard. Where items are not specifically covered by the additional requirements they should meet the relevant requirements of Part 1 or any other sections that may apply. Like all equipment they should then be subject to a risk assessment in the UK.

Operators and providers are advised that playground equipment requires regular maintenance; guidance on this and appropriate inspection, maintenance and operational schedules are contained within EN 1176-7:2008. Clause 6 of this standard provides for inspection and maintenance information and guidance from the manufacturer of the equipment; this is to assist operators in determining their safety management system.

It is appreciated that playgrounds are likely to contain a range of equipment from different manufacturers and installed over a number of years; operators should implement any guidance provided by the manufacturer. Item specific detail is not readily available to Annual Playground inspectors whose report contributes to the operators overall Annual Main Inspection as detailed in this standard.

Playground equipment not complying with EN 1176-1:2017 should not automatically be considered as being unsafe or requiring replacement. A risk assessment by competent persons should be used to determine what action, if any, is necessary. Manufacturers and inspectors of the Register of Play Inspectors International (RPII) are amongst those that will be able to assist in this.

DEFINITIONS

The official definitions may be found in the **Standard**.

The explanations which follow attempt to explain them in everyday terms. The definitions selected are primarily for the purchaser; those 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. The standard refers to equipment that is permanently installed; equipment produced for the domestic market is not covered by this Standard (EN 71 & the Toy Directive apply). It does not include ancillary items such as fences, seats, litterbins etc. European standards for wheeled sports & multi-use games areas have been published along with standards for Parkour and Outdoor Fitness Equipment.

Climbing equipment: items on which children cannot stand unaided but must hold on, requiring three points of contact unless moving.

Playing surface: the ground or the surface from which play commences.

Forced movement: a movement to which a child is committed by the design of the equipment (i.e. swinging, sliding or rotating).

Free space: the space in which children are undergoing a movement forced by the equipment (i.e. slide chute or fireman's pole).

Falling space: a 3D space through which a child may fall from an elevated point on the equipment.

Free height of fall: distance from the clearly intended body support, or from a 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 19-20.**

Impact Area: the area where the child will strike the surface after undergoing a fall (see Section on Surfacing **page 33**).

Grip and grasp: a specific part of the equipment which the child needs in order to support their weight will require grip, whilst a specific part the child requires 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 in the users' path (see diagram 2 on page 14).

Easily accessible: requiring only basic skills to access the equipment and not slowing the child sufficiently to allow time for a parent or carer to intervene.

Cluster: separate items designed to be grouped together (i.e. adventure trails).

“

Authors note: Space between individual items in the cluster must be appropriate to the intended age, for example, no more than 500mm to enable continuity of movement. There should not be any falls in excess of 600mm between adjacent components on a structure.

Steep play element: a play feature steeper than 45° used to enter or leave equipment.

Adequate level of impact attenuation: properties of a surface having the necessary impact attenuation for a given free height of fall.

Bouncing facility: suspended bed, similar to a trampoline although with reduced bouncing characteristic to those typically found in a gymnasium.

MARKING

Equipment should be permanently marked and include:

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

"HAGS have been in the forefront of Standards development for the last 30 years. These latest EN versions are approved by 33 European countries and provide an essential bench mark from which products can be judged. "

Andy Yates

MINIMUM SPACE 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; this measurement should be stated by the supplier).

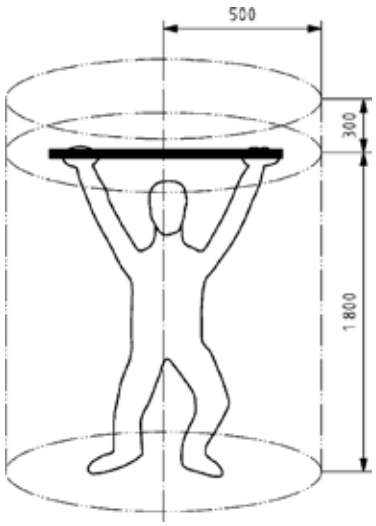
3. Falling space (surfacing area). Free spaces may not overlap; falling spaces may overlap but free spaces and adjacent falling spaces may not overlap (**dimensions are given in the Surfacing section on page 33**).

The free space is measured vertically as well as horizontally (i.e. as if a tin can is enclosing the child and moving with them - **Diagram 1**).

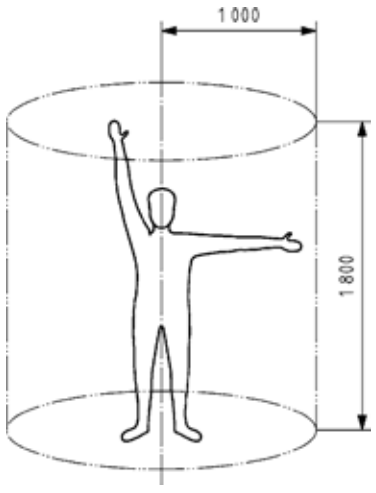
The measurements for the free space are:
a) Standing A: 1000mm B: 1800mm
b) Sitting A: 1000mm B: 1500mm
c) Hanging A: 500mm B: 300mm
above the hanging position and 1800mm below.

Some equipment may have different measurements set by the supplier.

Diagram 1



Hanging user



Standing user

Free height of fall

This is determined by the different body positions of the user i.e. standing, sitting, hanging, climbing or bouncing. The maximum free height of fall allowed is 3m.

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, for platforms with fireman's poles the minimum clearance between the pole and take-off platform is **350mm**. Traffic flows should not go through the free space.

Authors note: Fireman's poles should meet grasp requirements.

Protection against injuries in the falling space

There should be no obstacles in the falling space onto which a user could fall and be injured.

Certain parts of the structure are allowed in the falling space:

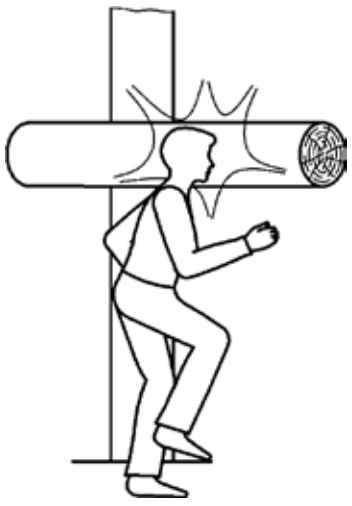
- Adjacent parts less than 600mm difference in height
- Parts supporting or containing the user
- Parts angled at greater than 60°

Platforms with fall heights of more than 1m between them require tested impact absorbency.

Protection against injuries due to other types of movement

No unexpected obstacles (**Diagram 2**).

Diagram 2



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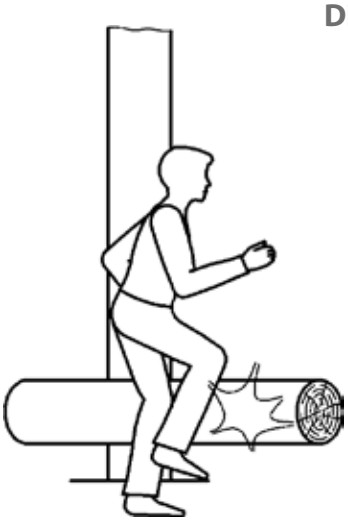

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GENERAL SAFETY REQUIREMENTS

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 through selection of the correct species, with sufficient natural resistance or by construction methods (e.g. post shoe) or preservatives. Metal fastenings should not be corroded by the timber species used, any paint or preservative. Preservatives should be to EN350-1 and in accordance with EN 335 use Class 4.

No coal-tar oils (i.e. creosote). CCA (Copper, Chrome and Arsenic) should not be used. Weather-proofed plywood should meet EN 636.

Splits in single pieces of wood shall not be considered as finger entrapment where the gap diminishes towards the centre of the wooden part.

Metal: Metals should be protected against corrosion. Metal producing toxic oxides/flaking must be protected by a non-toxic coating.

Author's note: Incompatible metals may accelerate 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.

REACH Regulations: Materials and surface coatings need to be confirmed to the 'REACH' Regulation (EC) 1907/2006 and its successive modifications. These contain details of certain substances that need to be controlled in consumer products. The regulations are often amended and quite complex, so specialist advice may be required.

Design and manufacture

The equipment must be suitable for the intended user and risks should be clear and foreseeable for the child.

Accessibility: Adults must be able to gain access to help children.

Grip requirements: Permitted diameter: 16-45mm.

Grasp requirements: Permitted maximum diameter 60mm.

Finishing

- Timber species and synthetics should have low susceptibility to splintering.
- No protrusions or sharp-edged components (i.e. protruding nails).
- Protruding bolt threads must be controlled within specific limits.
- 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. the 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 & CHAINS

This section covers ropes, chains and nets.

Fibre ropes
- Conform to EN ISO 9554 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 it is only the rope that needs to 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.

Authors note: Older chains that have worn and do not meet this requirement would generally be viewed as very low risk; typically, chains should be changed when 40% worn.

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 easily form loops.

Climbing ropes

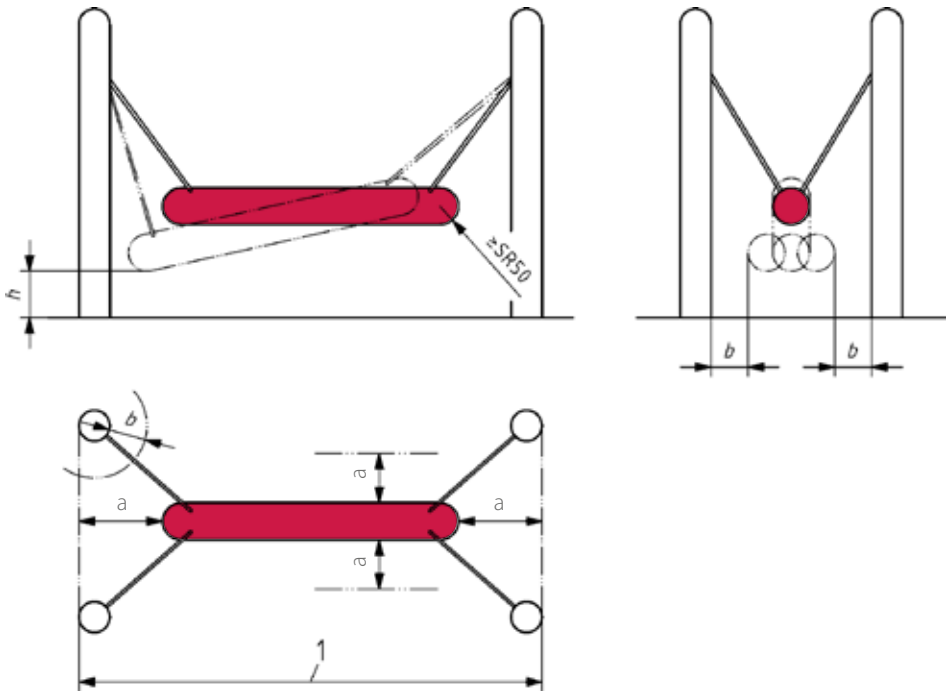
- Anchored at both ends.
- Probe C or E should not be capable of insertion through any possible loop.
- Single climbing rope diameter: 18-45mm.
- Nets should meet grip requirements.

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 300mm.

Diagram 3



Key

h	ground clearance
a	range of motion, ≤ to 300mm
b	free space towards standing construction, ≥ 230mm
1	maximum deflection

HANDRAILS, GUARDRAILS AND BARRIERS

DEFINITIONS

Handrail: a rail to help the child balance.

Guardrail: a rail to prevent children falling.

Barrier: to prevent the child from falling or passing under

Handrails

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

Guardrails and barriers

Depending on the platform height and accessibility, platforms may require guardrails and/or barriers.

Easily accessible equipment

- Platforms up to 600mm high: no guardrails or barriers required
- Platforms 600mm high and above require barriers at least 700mm high above the standing surface.

Equipment not easily accessible

- Platforms up to 1000mm high: no requirements.
- Platforms between 1000mm & 2000mm high: guardrails to be provided 600mm – 850mm high above the standing surface.
- Platforms over 2000mm high: barriers required 700mm high or more above the standing surface.

Barriers should not include intermediate bars or rails that encourage climbing; the tops of barriers should not encourage standing or sitting

Author's note: 70mm maximum flat surface recommended.

Entrances or exits

- At the access and exit openings of 'steep' play elements from a platform (i.e. a fireman's pole) the opening in the barrier shall be 500mm maximum at any point unless there is a guardrail.
- The width of the access opening for stairs, ramps and bridges should be no greater than the access item.
- For play elements with an inclination over 45° which are not easily accessible (e.g. a scramble net) the opening is 1200mm max.
- Steep play elements (over 45°) on easily accessible parts of equipment should have 500mm maximum openings and platforms a maximum of 2m high.

Ladders

Ladders should:

1. Have rungs and/or sides up to 60mm cross section (grasp) or have handrails 16 - 45mm (grip).
2. Be evenly spaced (though not between the top rung and the platform or the bottom rung and the ground).
3. Be non-rotating.

- There should be a clear space behind the rung or step, when measured from the tread centre line, of more than 90mm when measured horizontally to the ladder.
- Ladder sides may be higher than the platform.

Stairs

Stairs should:

1. Be evenly spaced.
2. Have a minimum tread depth of 110mm.
3. Have a 30mm maximum gap between the tread front and the next tread back.
4. The total projection should be at least 140mm.

Stairs over 2m in vertical height should have an intermediate landing at less than 2m intervals of the same width and be over 1m long.

Guardrails and barriers should have 600mm high handrails from the first step and meet grasp requirements.

- Barriers are required above 600mm; a guardrail may replace the barrier for stairs up to 1m high as long as the gap beneath the guardrail is less than 600mm high when measured from the middle of the tread.
- Guardrails should be provided from the first step.
- Guardrails and barriers should meet grasp requirements or have a handrail provided.

Ramps

(inclined surfaces up to 38° from the horizontal with a constant angle).

Ramps should:

- Have slip-resistant measures if accessible to all ages i.e. footholds.
- Have 600mm high handrails from the first step and meet grasp requirements.
- Barriers are required above 600mm; a guardrail may replace the barrier for stairs up to 1m high as long as the gap beneath the guardrail is less than 600mm.
- Guardrails should be provided from the beginning of the ramp.
- Should be level +/- 3° across the width.

Authors note: Surfaces of greater inclination are not regarded as ramps but can be used as a means of access.

BOUNCING FACILITIES

This section covers bouncing facilities.

A bed area of less than 1.44m² is defined as small
Falling space 1.5m from the bed perimeter

Beds over 1.44m² are defined as large
Falling space is 2m from the bed perimeter

Beds with a predetermined direction of movement
Falling space is 3m from the bed perimeter

Fall height
Max 900mm above the suspension bed

Free space
1.5m from the bed perimeter and 3.5m above

Elevated suspension beds
Not more than 600mm above surrounding ground level

“

Authors note: Bouncing facilities installed flush with the ground surface should have adequate drainage to prevent water from collecting at the bottom.

SWINGS

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

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

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.
Swing: where the pivot point or universal joint is more than 1.3m above the ground
Group swing seat: seat with a large surface area intended for several users i.e. basket swing seats, tyre seats or swinging beds.

Requirements

- No all-rigid suspension members (i.e. solid bar top to bottom).
- Type 1, 2 and 4 swings should be designed principally for use by seated children, whilst Type 3 should be designed for use by both seated and standing children.
- Two seats per bay maximum; swings with group swing seats should have only one seat per bay.

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

- Cradles should be designed so that children do not slip through the frame.
- Type 3 swing chains should not twist round each other.
- All groups swing seats should have a secondary safety mechanism.

Authors note: This may be internal.

- Type 4 swings should discourage children from jumping forwards, for example, through seat design.

Dimensions

- Minimum ground clearance at rest: 350mm for Flat and Cradle seats.

Authors note: A minimum 500mm seat height is recommended to provide room for legs of older users to swing through.

- No maximum seat to surface height. 400mm minimum for Group swing seats to the lowest part of the seat, in worst case position.
- Distance between seat and frame: 20% of swing suspension + 200mm.
- Distance between seats: 20% of the swing suspension + 300mm.
- Distance between seat and frame from group swing seats: 20% of swing suspension +400mm.
- 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

Authors note: Swing sets for young children should be separated from those for older children and sited to avoid cross traffic.

Surfacing requirements - Free height of fall

FFH is calculated from the centre of the stationary seat surface at 60° . For group swing seats this is the centre of the top of the rigid frame.

Authors note: Can also be calculated as length of suspension x 0.5 plus the height of the seat.

Forward and back

There are 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.

Where synthetic materials are used an additional unobstructed space of 500mm at either end is required.

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, measured vertically).

Surfacing 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 plus 300mm.

Surfacing area for a 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** and **bannister rails** etc.

Safety requirements

- Free-standing slides: the maximum vertical height that a stairway can reach without a change of direction or offset by the minimum width of the access is 2.5m.
- Starting section at the top of each chute: length 350mm minimum, 0-5° downwards at the centre line.

Authors note: This can be the platform for attachment slides.

- Barrier requirements apply if the starting section is over 400mm long.
- From a platform, the opening to the slide should be the same width as the starting or guarding section.
- For attachment slides with over 1m 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 with a fall height over 1m there should be a guardrail across the entrance to the slide at a height of between 600mm & 900mm.

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.

- A free standing slide's starting section should have a guarding section equivalent to barrier requirements.

Sliding section

Maximum length of initial straight sliding section: 7m.
Maximum length of subsequent sliding sections: 5m.

Sliding section (continued)

- Maximum angle: 60° at any point and an average overall 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.
- Jointed slides should not allow entry of sharp objects between sections.

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 0.3 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.

“

Authors note: There is no minimum run-out height.

Chutes should have a side height of:

- Fall height up to 1.2m: 100mm minimum
- Fall height 1.2m – 2.5m: 150mm minimum
- Fall height over 2.5m: 500mm minimum
- Fall height over 2m (easily accessible): 500mm minimum
- Maximum side angle from slide bed: 30°.
- 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.

Multi-track slides

- Multi-track slides may overlap their free-spaces.

Surfacing requirements

Normal distances apply except for the run-out which should be:

- Type 1: 1m each side and 2m beyond for sliding sections greater than 1.5m, 1.5m beyond for sliding sections of less than 1.5m.
- Type 2: 1m each side and 1m beyond.

CABLE RUNWAYS

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

Safety requirements

No barriers or guardrails required on platforms less than 1m high if not easily accessible.

The stop at the end, or the angle of the cable, should progressively slow down the traveller; the angle of swing should be less than 45°. The traveller should not be removable except with tools.

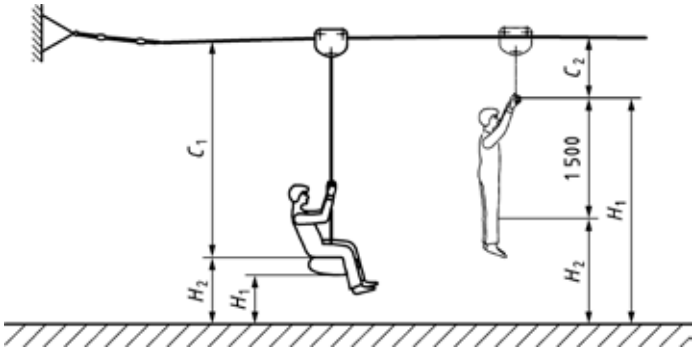
No access to internal mechanism. The suspension mechanism should be flexible and exclude the risk of strangulation.

- Where children hang by their hands, the grip should not be enclosed.
- 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.
- When loaded (69.5kg): maximum speed is 7m per second and the seat height should be a minimum of 350mm.

DEFINITIONS

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

Diagram 4



Key

C_1 cable height — seating type
C_2 cable height — hanging type
H_1 ground clearance
H_2 free height of fall

Free space

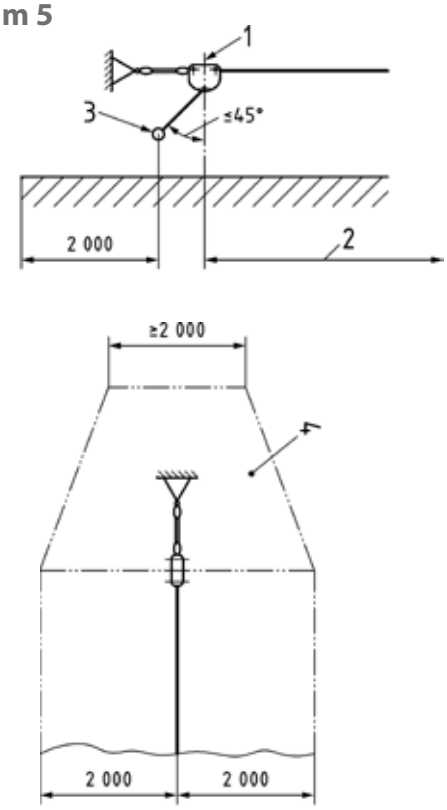
- If two cables are placed parallel the minimum distance between them is 2m.

Impact areas

2m either side of the cable and 2m beyond the seat at end of travel extended to 45º.

- Suppliers must provide extra information (i.e. cable settings and permissible gradients) for this item in addition to the information detailed on **Page 39**.

Diagram 5



Key
1 end of travel
2 area of travel
3 maximum swinging position of seat or grip (see 4.14)
4 impact area (see 4.14)

CAROUSELS

A **Rotating chair**

B **Traditional platform roundabout**

C **Overhead rotating item with hanging grips**

D **Track-driven roundabout**

E **Large revolving discs**

Requirements

NB. Safety requirements Type A, B, D and E all have a maximum free fall height of 1000mm. Type C free height of fall is measured from the grip position minus 1500mm.

- Hand grips should be between 16-45mm.

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

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 attenuation.

Type B:

- Platforms should be circular and closed.
- 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 8mm gap between the edge and the ground and a vertical displacement (trip hazard) of less than 20mm.
- If not set flush, ground clearance should be more than 400mm or 60 - 110mm maintained for 300mm underneath. The underside of the platform shall be smooth maintained for 500mm towards the axis.

Type C:

- Handgrips must be the same height and, if below 1.8m, flexible.
- Free space and falling space is 2m when flexible handgrips are at 30°.
- In addition to the required surface area an additional 1m unobstructed space should be provided around it.

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 for synthetic surfaces: 400mm and 300mm for loose fill surfaces.
- Maximum platform height: 1m.
- Free space/falling 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.

General Requirements

- Free space/falling space for types A, B and D is 2m all round.
- Vertical head clearance from platform: standing 2.0m.
- Small rotating items under 500mm diameter are excluded.

ROCKING EQUIPMENT

1 **Traditional single central pivot up and down seesaw**

2a **Typically a single spring rocker with main movement in one direction**

2b **Typically a single spring rocker moving in more than one direction**

3a 3b **As 2a and 2b but with multi-springs support components**

4 **A multi-pivot rocking item**

5 **Sweeping seesaw (with vertical and horizontal movement- i.e. a HAGs Mobilus or Lappset Waltzer)**

6 **Overhead single-axis seesaw (i.e. rocking beam with hanging seats)**

DEFINITIONS
Rocking equipment which can be moved by the user and is pivoted from central support.
Damping: any movement restricting device.
NB. Springs are treated as self-damping.

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	1000mm	-	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 when tested with the appropriate user load.
- Progressive restraint at extremity of movement is required by use of a spring or other damping equipment.

- Hand grips should be provided for each seat or standing position.
- Foot rests and hand grips should be firmly fixed and non-rotating.
- The projecting end of grips should have a surface area of at least 15cm² (if circular the diameter should be over 44mm minimim). Test with ring gauge - the grip should not protrude through the gauge.
- Hand grip diameter: 16-45mm (for toddler items: 30mm maximum).
- The main body profile of corners on moving equipment should be 20mm radius minimum.

Movement

Type 6:

Free-fall height should not exceed 2m when seat angle is at 20°.

SURFACING

A variety of materials are allowed, for example, wet-pour, loose-fills, grass reinforcement mats etc. EN 1177 now refers only to methods of test. Other requirements are in Part 1 of EN 1176 & BS 7188: Impact Absorbing Playground Surfaces: Performance Requirements and Test Methods (last published 2009 and covers some aspects of surfaces not applicable outside the UK).

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.
- Loose fills should be 100mm more than the depth required to meet the HIC reading.
- Hard surfaces can only be used for static equipment under 600mm high or outside the impact area.
- Tested impact attenuating surfaces should be used where there are falls over 600mm or where forced movement is possible.

The use of topsoil or turf is left to each country (See note on next page).

DEFINITIONS

Free height of fall: the distance from the clearly intended body support, or from 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).

Impact area: the area which can be hit by the falling user.

Loose fill material recommended depth requirements.

material	particle size	min. depth*	max. fall height
bark	20 - 80 mm	300 mm	3 m
wood chip	5 - 30 mm	300 mm	3 m
sand & gravel	0.25 - 8 mm	300 mm	3 m

***100mm must be added to the depth to allow for displacement and compaction during use**

Author's note: : The 2017 version of the standard contains a new Annexe H which specifies testing requirements for impact attenuating surfacing after installation; this annexe is replaced by a national UK annexe as set out below:

UK requirements: procedure for confirming the adequate level of impact attenuation after installation of impact attenuating surfacing.

Significant changes in the requirements for testing the impact attenuation (absorbing) of playground surfacing have been introduced into this edition of the standard (clause 5.2) to reflect national variations in surfacing provision. The UK provide in this National Annex requirements to replace Annex H; these reflect current practice that have demonstrated over the lifetime of the current standard to be reasonable and proportionate.

Testing or confirmation of the surface impact attenuating properties, after installation, is not a requirement of this UK National Annex. It is strongly advised that the operator confirms that any surfacing provided has an adequate level of impact attenuation for the critical fall height of the playground equipment; this should be confirmed by a certificate of test from a UKAS registered laboratory. For Post Installation Inspections, the considered depth of the surface should be ascertained and provided to the operator, for comparison to this original certificate of test.

For all surfacing it is important that an adequate level of impact attenuation for the critical fall height be maintained. In the instances of loose fill surfaces, confirmation should be undertaken frequently as these surfaces will compact and disperse reducing their depth and impact attenuating properties during normal use.

Some products rely upon a combination of the product and the surface on which they are installed to achieve their critical fall height, such as with the use of grass. The formation surface, e.g. the soil, on which these products are installed can vary from location to location. Their critical fall height properties can be additionally affected by climate, moisture and compaction of their formation surface. Their overall impact attenuating properties therefore cannot be guaranteed by certification. Testing on site in accordance with EN 1177:2017, will only provide an indicative, critical fall height performance. Laboratory testing the surface mounted element, complete with any fixings in accordance with EN 1177:2017, will provide a critical fall height as tested on concrete, although this figure will take no account of any benefit provided by the site specific formation surface.

Grass alone, on playgrounds, can, with a low intensity of use, be successfully used below and around play equipment, removing the necessity to install specialist Impact Attenuating Surfaces as long as the criteria below are met.

- The maximum fall height of the equipment is less than 1500 mm.
- The grass shall have at least 150 mm of top soil beneath it.

NOTE - A reasonable evaluation may be made by pushing vertically by hand into the ground a thin probe, such as a screwdriver, to a depth of 150 mm at regular and frequent locations, without it being impeded by solids, such as stone, brick or tree roots.

- It should be ensured that the grass will be able to remain throughout the year and does not become mud or bare earth. Its impact absorbency is dependent upon the roots maintaining a non-compacted soil structure.

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 1999 and 2006 amendment).

Assessing Inspector Competence

Work has been ongoing for some while within the European Standards Organisation (CEN/TC 136/SC1) to produce a document setting out the requirements for the knowledge and experience that inspectors need to undertake their work in a competent manner; at all levels of inspection. This document TR 17207 should be available in 2018 and will help to ensure that those persons responsible for checking playground safety have received the appropriate training and achieved a demonstrable level of competence. Both the Play Inspection Company and the RPII (Register of Play Inspectors International) have been actively participating in the process of preparing this document. In the UK the RPII acts as an accrediting examination body for assessing the competence of inspectors.

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 provide owner details and emergency service contact points.
- Entrances for the emergency services should be freely accessible.
- Information on accidents should be kept (The Play Inspection Company or HAGS has a suitable form).
- Staff and users should be safe during maintenance operations.
- Single post equipment requires special attention. The latest guidance does include some requirements which is currently being reviewed at a national level.

Installation

- Equipment should be installed safely to the appropriate national building regulations and to the manufacturer's specifications. Foundations should not present a hazard; in loose-fill surfaces, foundations should be

(continued on page 38)

> Two decades of experience has taught us exactly what's needed from playground inspection tools to make your job easier. Collaborating closely with our skilled software developers, we've worked hard to create a playground inspection app that exceeds the demands of its users.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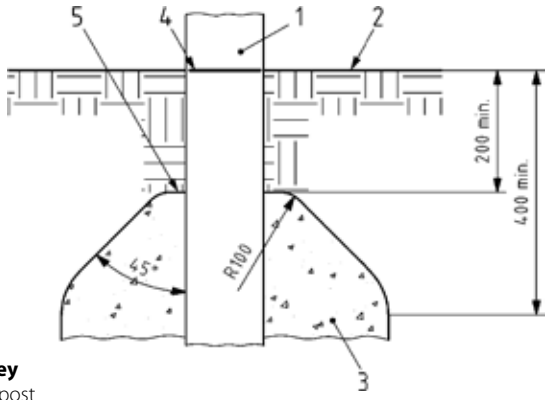
400mm below the surface or, if tapered for water shedding, 200mm, or be covered by the equipment. There are no specific requirements for synthetic surfaces (**Diagram 6**).

Diagram 6



Key
1 post
2 playing surface
3 foundation
4 basic level mark
5 top of foundation

NOTE The basic level mark given by the manufacturer on the equipment shows the level of the playing surface. This basic level should be maintained.

Inspection

Frequency: Manufacturers may recommend the inspection frequency of inspections required although high-vandalism or high-use sites may need a more frequent check than that which is specified – a risk assessment should be undertaken to establish the necessary frequency of inspection for individual sites.

There should be a three-tier inspection regime in place for all playgrounds; these will normally consist of:

Routine visual inspections: identification of obvious hazards resulting 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 by the manufacturer. Checks operation, stability and wear and tear of the equipment etc.

Annual Inspection – checks operation and stability of the equipment, wear and tear, compliance with current standards and overall levels of safety for the area.

Post-installation inspections: these should be carried out immediately after installation on new or refurbished sites, preferably prior being made open to the public, and should be carried out by an independent organisation with appropriately trained inspectors, such as the Play Inspection Company.

Author's note: In the UK this inspection should be carried out by an inspector accredited an Annual Outdoor Inspector by the Register of Play Inspectors International (RPII) www.playinspectors.co.uk.

Training and RPII 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.
- 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. The 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 and 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.

Pre Delivery Information
Information should include details of:

a) minimum space
b) surfacing requirements
c) details of foundations and any specific provisions for their accessibility
d) dimensions of largest part
e) mass of heaviest part (in kg)
f) intended age range
g) availability of spare parts
h) certification of conformity with the standard
i) if the equipment is intended for indoor or supervised use only

Installation information
In addition to the above list the following should be provided at the time the product is supplied:

a) delivery parts list
b) full installation instructions
c) post-installation instructions
d) run-in period instructions
e) inspection and maintenance instructions
f) servicing instructions
g) details of any special disposal requirements
h) 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.

EN 1176 PROBE SET

One of the important safety principles of EN 1176 is to provide some controls against users becoming unintentionally trapped in the equipment provided.

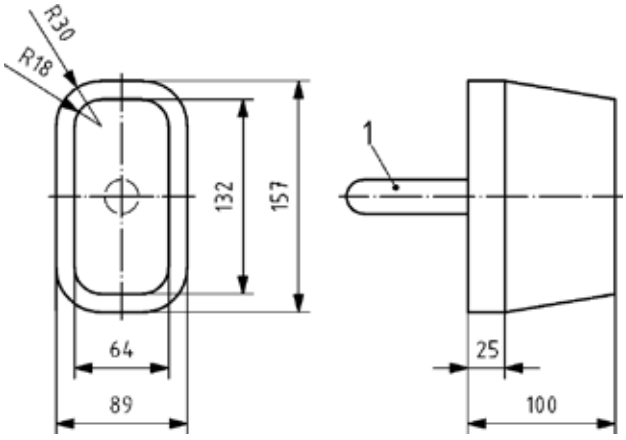
The safety priority is;

1. Protection against head and neck entrapment.
2. Protection against finger entrapment.
3. Protection against other entrapment situations, including whole body, limb, clothing, etc.

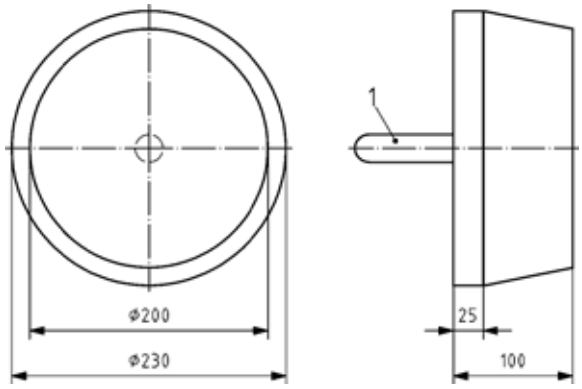
The probe set shown here provides a set of tools that help with the assessment of openings and avoid those that are most likely to lead to an entrapment situation.

Authors Note: Assessment with probes should only be undertaken by an appropriately qualified inspector (RPII Annual Inspector Outdoor).

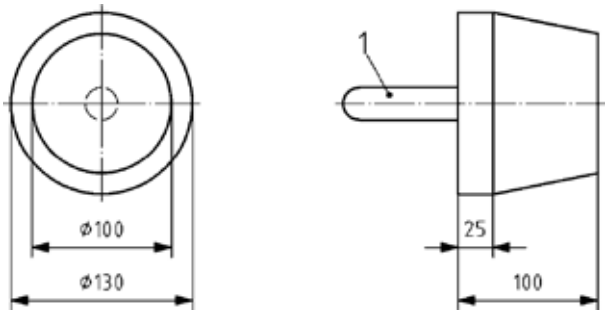
PROBE C TORSO



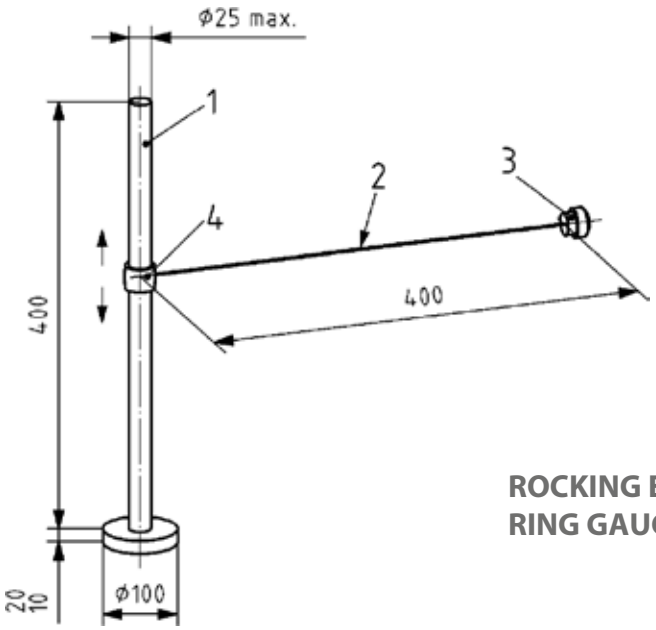
PROBE D LARGE HEAD



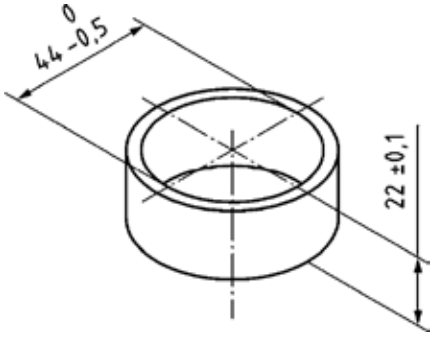
PROBE E SMALL HEAD



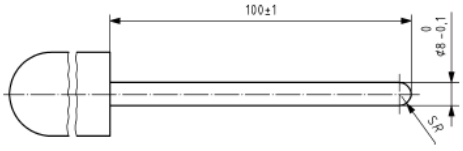
TOGGLE ENTRAPMENT TOOL



ROCKING EQUIPMENT RING GAUGE



a



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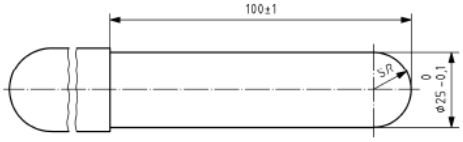
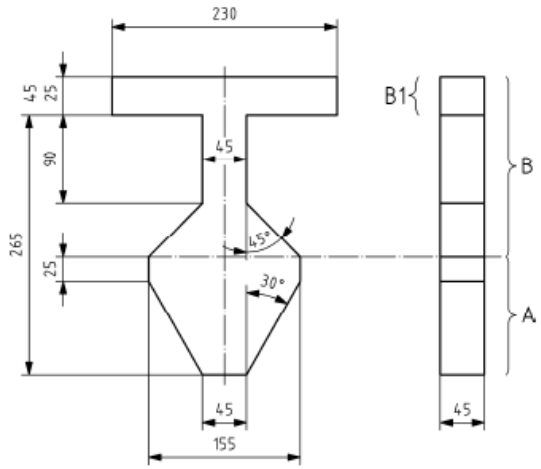


V SHAPED HEAD AND NECK ENTRAPMENT PROBE



Key
A "A" portion of probe
B "B" portion of probe
B1 shoulder section

Test template for assessment of head and neck entrapment in partially bound and V-shaped openings

a
8mm DIAMETER FINGER ROD

b
25mm DIAMETER FINGER ROD

Please note: the finger rods are hemispherical at the ends

Authors Note: These general finger rods should not be used when testing chains, see specific requirements on **page 17**.

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