



# A Guide to Playground Safety Surfacing

## Playground safety: **THE FACTS**

Playgrounds offer children fun, fresh air and exercise in what should be a safe environment. Unfortunately, each year in the UK approximately 40,000 injuries occur in children's playgrounds (RoSPA). Although most of these injuries are minor mishaps – a bumped head, bruised elbow or grazed knee, in a number of cases, hospital treatment is necessary.

Accidents can happen for a number of reasons including poor equipment design & installation, insufficient maintenance, lack of supervision, improper use of equipment and inclement weather conditions, so you need to ensure that you have done all you can to prevent injury at your site.

Increased awareness, Health and Safety Regulations and the threat of legal action has all led to increased playground safety. This is also largely because those responsible are at risk of being sued for negligence if they fail to take reasonable care to ensure safety and limit the chance of 'reasonably foreseen' accidents.

Many accidents involve falls to the ground from equipment and with kids being kids, this is a tough one to prevent! Having the right safety surfacing won't prevent the fall, but once the child impacts with the ground the safety surfacing reduces the likelihood of serious injury. Whereas once, a child would have fallen onto concrete or hard ground, safety surfacing cushions the blow, reducing the severity of any injury. Although there is no legislation relating directly to safety in children's playgrounds, relevant Acts of Parliament include:

- [Occupier's Liability Act \(1996\)](#)
- [Health and Safety at Work Act \(1974\)](#)
- [Management of Health and Safety at Work Regulations \(1999\)](#),
- [Consumer Safety Act \(1978\)](#)
- [Consumer Protection Act \(1987\)](#)

Although the above do not provide immunity from legal action, courts frequently look for British (BS) and European (EN) standard compliance as evidence of good practice.

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# Making the right choice of Playground Safety Surfacing

Kids love to play and they should be encouraged to be active and enjoy playtime - it's an important part of their development! However, with children's safety paramount, the surface you choose for your playground is a vital part to ensure children's safety.

Choosing which safety surface to use is an important part of the overall design of any play area. With so many options available and so many factors to consider, it can be a complicated business. Opting for the cheapest surface may seem the best solution for your budget, but cost is only one factor that should be taken into consideration. This booklet aims to highlight the main issues that you should consider when choosing a safety surface.

All playground safety surfacing should be independently tested and certified to British & European Standards:

- [BS EN 1176 - Playground Equipment and Surfacing](#)
- [BS EN 1177 - Impact Attenuating Playground Surfacing](#)
- [BS 7188 - Impact Absorbing Playground Surfaces](#) (superseded in part by BS EN 1177)

These standards cover safety requirements and test methods for Impact Absorbing Surfacing (IAS).

The UK Government issued the first guidelines for improving safety in children's playgrounds in 1978. Since then, standards have been developed to measure and assess the suitability of playground surfaces for safer play provision. Existing playgrounds that do not currently have an IAS do not have to install one unless the area and/or equipment is being refurbished. However, good practice dictates that you should ensure your playground is as safe as possible, and includes suitable safety surfacing. All new playgrounds must have an IAS fitted at the time of completion.

**NB:** Play equipment that has a fall height of less than 600mm and will not introduce a 'forced movement' on the user, does not require an IAS to be installed.

BS EN 1177 states that:

- Safety surfacing should have no sharp edges or protrusions
- Safety surfacing should have no entrapments (i.e. limbs, fingers & heads cannot become trapped)
- Hard surfaces should only be used outside the impact area (this is the area that the child will land on should they fall from equipment)
- Impact Attenuating Playground Surfaces should be used where falls to the ground over 0.6m are possible

Amendments to BS EN 1176 have led to the inclusion of grass as an IAS where falls to the ground are not greater than 1.5m. It should be noted, however, that the use of grass as a safety surface is subject to a number of specific requirements:

- There should be a sufficiently detailed risk assessment carried out at each location where the use of grass as an IAS is considered.
- There must be a minimum of 15cm soil beneath the grass and not impeded by a high proportion of solids such as stone, brick or roots.
- The grass must remain in good condition throughout the year and not be allowed to become mud or bare earth.
- The condition of the grass needs to be continuously monitored so that the maximum impact absorption is maintained
- Grass should only be considered as a safety surface in areas where intensity of use is low. High wear areas will quickly erode grass.



The playground surface must be suitable for children and adults who use walking aids, wheelchairs or are unsteady on their feet.

A final note on grass is that the likelihood of where it may be used is also often where the youngest children will play. These less competent and unsteady children arguably need more protection than their older playmates. Best practice of fitting a superior IAS should therefore be considered. A surface such as Safety Matta could be used as this provides a superior IAS, whilst still allowing grass to grow through the surface for a green, natural finish.

All children need to be able to access the area easily, so the surfacing should be wheelchair and walker friendly as well as being suitable for people who may be unsteady on their feet.

Certain materials are inherently easier to move across than others i.e. a solid surface as opposed to loose fill material. Loose fill materials such as bark, rubber chips or sand may allow passage for short distances but larger areas can prove more difficult to cross. Any raised pits of loose fill material should have ramps or alternatives to allow access for wheelchair users.

# Which surfacing is the best?

**Unfortunately, there's no one right answer to this question!**

The best surface for your playground will be the one that meets your individual site and budget requirements. The surface needs to last many years outdoors, ideally with the minimum of maintenance (it is important to note that surfaces with maintenance requirements have both a labour and ongoing budget implication). It is essential that your surface meets the required critical fall height (CFH) for the equipment chosen and offers ease of accessibility for all users.

Other factors to consider include:

**Durability:** Does the surface require ongoing attention to maintain its safety properties?


**Hygiene:** Can any nasty substances or harmful objects such as dog mess or needles be easily hidden within the surface?

**Damage:** What are the flame retardant properties of the material? As part of BS EN 1177, IAS are tested to ensure that if a small source of ignition, such as a lit cigarette or similar, is dropped, no damage will be caused to the surface. However, if a fire is started by vandals, you should consider how the surface will react to prolonged exposure to burning debris.

**Ease of Repair:** If damage does occur, how easy is it to fix and what will the repaired surface look like? I.e. will it look patched and untidy? Will the repaired area present a weak spot in the surface?

**Drainage:** How easily does surface water drain away?

**Customer Service:** What levels of service or aftersales support does the supplier provide?



Animal mess and needles are easily hidden in loose fill type surfaces

## The following offers a brief evaluation of surface type against factors that should be considered when selecting a Safety Surface

	<b>Matta Products</b> interlocking tiles (Safety Matta & Play Matta)	<b>Bark Chip</b>	<b>Synthetic Grass</b>
What critical fall height does the surface provide?	<b>Up to 4.5m</b> Dependent on product	<b>Up to 3m</b> Dependent on depth of installation	<b>Up to 3m</b> Dependent on product and installation
Is the surface easy to maintain and durable?	<b>Low Maintenance</b> Occasional power washing may be required to remove possible moss growth in shaded areas	<b>High Maintenance</b> Natural product so can break down outdoors after a relatively short time. Pits will need to be refilled and raked regularly	<b>Low Maintenance</b>
Does the surface provide easy access for wheelchair users and the disabled?	<b>Very Good</b> Solid surface with sloped and buried edges. No raised edges	<b>Very Poor</b> Type of material and raised perimeter reduces access	<b>Very Good</b>
What is the hygiene level of the surface?	<b>Very Good</b>	<b>Poor</b> Animal mess and syringes can be easily hidden	<b>Good</b> Attractive to animals which could lead to fouling
Can the surface be easily vandalised?	<b>Low chance of damage</b>	<b>High chance of damage</b> Possible fire hazard and material can be easily thrown and kicked	<b>Low chance of damage</b>
What is the flammability level of the surface? Will it catch fire easily?	<b>Low</b> Flame retardant surface will damage under continuous heat but won't encourage the spread of fire. Only damaged tiles will need replacing creating a seamless finish	<b>High</b> Prolonged exposure to heat or fire, particularly in dry weather, can cause product to ignite. Likely need to replace entire surface	<b>Low</b> Flame retardant surface will damage under continuous heat but won't encourage the spread of fire
What is the chance of injury?	<b>Low</b> Little chance of superficial injury	<b>Medium</b> Can cause injury to eyes if thrown. Bark can also cause splinters	<b>Medium</b> Friction burns may occur if a person hits the surface hard or at speed

Wetpour	Sand	Grass	Grass Mats
<p><b>Up to 3m</b> Dependent on depth of installation</p>	<p><b>Up to 3m</b> Dependent on depth of installation</p>	<p><b>Up to 1.5m</b> Subject to minimum criteria and a full risk assessment*</p>	<p><b>Up to 3m</b> Dependent on depth of installation</p>
<p><b>Variable</b> Over time heavy wear areas may become scuffed and begin to crumble and break up</p>	<p><b>High Maintenance</b> Ideally needs to be covered when not in use. Should be raked, sanitised and topped up regularly</p>	<p><b>High Maintenance</b> Easily worn and has little impact absorbency when dry. Requires regular mowing in summer months</p>	<p><b>Variable</b> Can sink in wet weather if no supporting underlay is used. Pulls apart over time as mats not interlocked</p>
<p><b>Good</b> Ramps and Low curbs required</p>	<p><b>Very Poor</b> Type of material and raised perimeter reduces access</p>	<p><b>Good</b> Can become poor when wet and boggy</p>	<p><b>Very Good</b> Tiles allow easy access for wheelchair users and pushchairs</p>
<p><b>Very Good</b></p>	<p><b>Poor</b> Can hide broken glass, syringes and animal mess easily</p>	<p><b>Poor</b> Can partially hide broken glass and syringes. Attractive to animals which could lead to fouling</p>	<p><b>Very Good</b></p>
<p><b>Low chance of damage</b></p>	<p><b>Medium chance of damage</b> Can be easily thrown and kicked</p>	<p><b>Low chance of damage</b></p>	<p><b>Medium chance of damage</b> Some products can be easily pulled apart</p>
<p><b>Low</b> Flame retardant surface will damage under continuous heat but won't encourage the spread of fire. Only damaged area will need replacing but finish may be patchy.</p>	<p><b>Low</b> Flame retardant surface</p>	<p><b>High</b> In dry weather grass can spread fire quickly</p>	<p><b>Variable</b> Many versions on the market. Check with supplier to confirm fire retardant properties.</p>
<p><b>Low</b> Little chance of superficial injury</p>	<p><b>Medium</b> Can cause injury to eyes if thrown</p>	<p><b>Low</b> Little chance of superficial injury</p>	<p><b>Variable</b> Little chance of superficial injury. Sometimes installed with metal pegs and cable ties that could cause injury</p>

\* See main text for full requirements for grass

### What is the Critical Fall Height?

A critical fall height (CFH) is the maximum height of fall from play equipment to the ground. It is important to note that safety surfaces do not prevent injury but aim to lessen the severity of any injury that may occur on falls from height. When selecting a safety surface for your play area, you should ensure that your supplier has independent test certificates from a recognised body. Ensure that the product has the required critical fall height properties for the height of each piece of equipment in the playground.

### What ground preparation is required before installing a safety surface?

This is dependent on the chosen surface. The supplier should provide you with full details of ground preparation requirements and in some instances, will prepare the ground base for you. To avoid hidden costs you should ensure that your quotation covers any ground work required as well as detailing any possible additional charges.

### Will the safety surfacing require edging?

Again, this will depend on the type of product you choose, as not all require it. Your supplier will provide you with full details of the edging/perimeters required. If timber edging is used, it must have no hazardous edging i.e. edges must be rounded or flattened to give a smooth finish. The timber must not be fixed with nails, but should be bolted or glued. Where the safety surfacing is not flush and level with the surrounding surface, the IAS should cover the full falling space.

Timber edges must be pressure treated and must not have been treated with Copper, Chrome or Arsenic (CCA). Precast concrete or other edging such as engineering bricks can be used, however, the design should avoid, as far as possible, introducing any trip hazards into a playground.

### Are loose fill surfaces better than solid surfaces?

According to RoSPA, both types of surfacing can work well. Although solid type surfaces may be more expensive to install initially, they can work out cheaper in the long run due to reduced levels of maintenance.

Loose fill surfaces should not be used for areas of heavy wear and repetitive motion, beneath swings or under conventional roundabouts, as the surface cannot be regulated i.e. troughs and peaks of material can occur. British Standards dictate there should be a minimum clearance between equipment and the floor to prevent entrapment of limbs (between 60mm & 110mm for a roundabout with a platform).

Tests have been conducted to determine the relative absorbency for some loose fill materials that are often used in playgrounds.

The following table shows the CFH in metres for each of the common loose fill surfaces. The materials were tested in a non-compacted state (i.e. the surfaces were loose and spongy) at depths of 6, 9 and 12 inches. They were also tested in a compacted state of 9 inches (as would occur in a playground situation over a relatively short period of time).



**Fig 1 Critical Fall Height of common loose fill surfaces**

Material	Non-compacted Depth			Compacted Depth
	6 Inch	9 Inch	12 Inch	9 Inch
Shredded Bark Mulch	1.8m	3.0m	3.3m	2.1m
Uniform Wood Chips	1.8m	2.1m	3.6m	1.8m
Coarse Sand	1.5m	1.5m	1.8m	1.2m
Fine Sand	1.5m	1.5m	2.7m	2.7m

Source: CPSC (Consumer Product and Safety Commission)

The table above should act as a guide only, but as a result of children playing on the surface, not only can the surface compact but the shock absorbcency levels of loose fill materials can vary greatly with the displacement of the material.

### Which type of solid surfacing is the best?

Wetpour is made from rubber crumb and can be a versatile surface in terms of the colours available and the designs created. However, issues can arise in terms of its durability, as the bonded rubber crumb surface can break up. This can be caused by insufficient binder in the mix, poor resistance to ultra violet light or vandalism. Continuous repetitive wear in a particular area (i.e. roundabouts and swings) can also cause the surface to start to break up.

When loose fill surfaces are displaced they provide no impact absorbcency

Play Matta tiles offer an excellent alternative to wetpour, with bright colours and design capabilities which can add vibrancy and interest to a site. The interlocking PVC tile construction won't break up, even in the heaviest of wear areas, a fact supported by the 10 year guarantee provided as standard.

Matting products that allow grass to grow through them are another popular option, as they can quickly blend in with the environment and provide a low maintenance, quick and easy safety surface. There are many products available that initially seem to offer the same solution, however, many of the 'grass mat' products do not have a robust & durable fixing system, are not installed by experts, are secured to the ground with only small or even metal pegs and are held together with plastic ties. The problem with this is that the tiles become displaced over time, creating trip hazards and a possible focus point for vandalism - no longer providing a safe surface for children to play on. Superior products in this category, such as Safety Matta, have an interlocking fixing system that offers a far more durable and resilient surface that will last a great deal longer. Again, this is supported by the 10 year guarantee provided as standard. Safety Matta is also flame retardant and will not ignite.

### How environmentally friendly are the different surfacing options?

Bark chip and sand are obviously both natural products but as already noted both have potential issues with hygiene and ongoing maintenance.

Play and Safety Matta, from Matta Products, offer a genuine, environmentally friendly solution. Both surfaces are made from up to 97% recycled PVC while the underlying shockpads are made from 100% recycled rubber.

Wetpour is made from recycled rubber crumb, also making it environmentally friendly. If considering wetpour as an option be sure to determine what proportion of the product is recycled, as this can vary greatly.

Grass mats contain little to no recycled content. This does however, vary from supplier to supplier so it's advisable to check before deciding on a surface.

### Can we fit the surfacing ourselves?

There are DIY systems on the market and if you do opt for one of these, ensure that you have good, clear installation instructions from the supplier. Loose fill surfaces would seem to be easy to install, however, remember that the fill depth of these are critical to achieving the correct CFH. It is advisable to have professional installers fit your safety surface, this ensures both the quality of the finish and peace of mind that the product has been installed correctly in order to provide the required fall protection.

DIY systems can also work out more costly than they may initially appear, as you must also add in the cost of groundwork preparation and labour to install the product.

### Can I use second hand safety tiles?

The re-use of second hand safety tiles is not recommended as you cannot be certain that the CFH impact absorbency is correct for your equipment.

### How far should the surfacing extend around the play equipment?

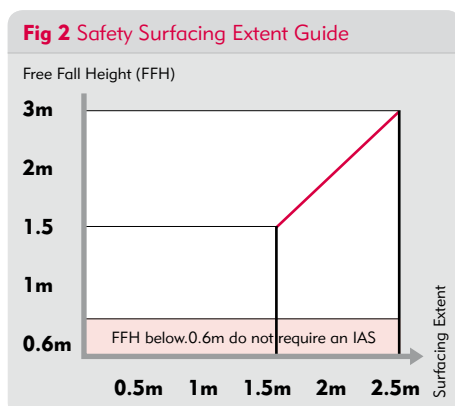
Children usually fall away from equipment, and the higher the equipment the greater the surface needs to extend away from it. Ensure that your surface is suitably extended by measuring the height above the ground of the highest point from which the child is normally supported - this is the maximum fall height.



The following graph shows the general surfacing extent (i.e. how far the surface should extend from the equipment) relative to the play equipment free fall height.

With heights between 1.5m and 3m, the surfacing extent is calculated by using the following formula:

$$(\text{Free Fall Height (m)} \times 0.667) + 0.5\text{m} = \text{Required Surfacing Extent}$$



(Source: RoSPA)

The following table shows what this actually means:

**Fig 3 Required Safety Surfacing Extent**

FFH	Surfacing Extent	FFH	Surfacing Extent
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

### Surfacing requirements for swings

The limit of motion in each direction is the point reached when the swing has travelled through an arc of 60°. This is calculated by the formula:  $0.866 \times \text{distance from swing pivot to swing seat}$ . The surface should extend 1.75m beyond this point. The width should be 1.75m for each swing or should extend to the internal face supports.

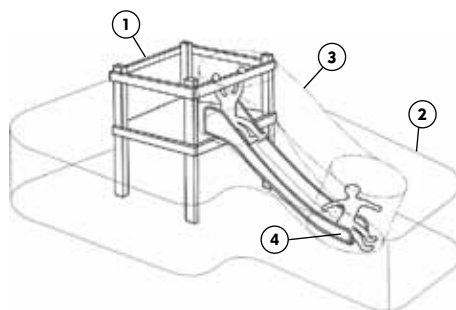
### Surfacing requirements for slides

The safety surfacing around the slide should extend between 1.5 metres and 2.5 metres depending on the free fall height from the equipment (see fig 2). When the height of the slide is below 0.6 metres, the surfacing should extend at least 1 metre on each side and this should continue into the run-out area beyond the slide end depending on the slide type:

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

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

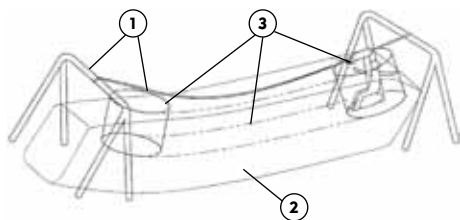
Contact your supplier to determine which kind of slide you have.



1. Space occupied by equipment
  2. Falling space
  3. Free space
  4. Run out
- 1+2+3= Minimum space

## Surfacing requirements for runways

For cable runways, be it a seated runway (below) or a runway where children hang by their hands to swing, the area of safety surfacing should extend 2 metres on either side of the runway's middle line. At the end of the runway, the surfacing should extend 2 metres further than the maximum swinging position of the grip or seat.



1. Space occupied by the equipment
2. Falling space
3. Free space

## Equipment layout

Collision accidents account for approximately 34% of play area accident reports (Source: API). Designing the layout of the playground can be a complicated task, and prime consideration should be given to the safety of the users of the equipment. BS EN 1176 sets guidelines on the aspects of 'Free Spaces' and 'Falling Spaces' between play equipments in play areas. All reputable playground equipment companies will take this into consideration when designing your site, and plan accordingly.

## What should I look for in a safety surfacing supplier?

### Membership of API

Ensure you are working with a company who is a member of the Association of Play Industries. Members adhere to the API's 'Code of Best Practice', which stipulates that suppliers must meet all BS, EN and DDA requirements. All API member equipment is independently tested to minimise any risks to users. Members are also recognised as being financially sound and able to fulfil tender criteria. These benefits give buyers complete assurance that both suppliers and their products meet all requirements and criteria set out.

### Expertise

Make sure that the company you choose to supply and install a safety surface has sufficient knowledge and expertise. Non-specialist companies may not have complete understanding of the product to install it correctly. Impact absorption of most surfaces depends on specific installation methods and highly skilled installers.

### Guarantee

The guarantees offered by safety surfacing suppliers can vary greatly, and are typically anything up to 5 years. The period of guarantee offered will give you a good indication of both the quality/durability of the product as well as the confidence the supplier has in their product & installation. In most cases, the longer the guarantee, the better the product so aim for at least a 10 year product guarantee if possible.

## How often should the surfacing be inspected?

All public play areas must have an annual safety inspection and report, ideally carried out by an Inspector with the Register of Play Inspectors International (RPII). Depending on the level of use, play areas may need operational inspections every few months, and this should cover all aspects of the playground including the surfacing.

Play areas with loose fill surfacing should be checked on a very regular basis, possibly weekly, to ensure that the surface depth remains compliant with the critical fall height for the play area, and that hygiene levels (with regards to animal mess, glass, syringes etc) are maintained.

A well maintained play area with good inspection regimes can help prevent accidents from occurring. For more information visit: [www.playinspectors.com](http://www.playinspectors.com)

## Am I able to apply for funding to help with the cost of the surfacing?

There are specific grant sources and funds available for children's play throughout the UK, including both Lottery and Government funding. Criteria and availability of each fund vary, as does the amount of money awarded to successful applicants. If you wish to apply for funding for your play area and require more information, visit the Matta Products website: [www.matta.co.uk](http://www.matta.co.uk) and download the free Funding and Grant Sources information sheet.

**40,000 injuries to children on British playgrounds each year.**

Source: RoSPA

**Playgrounds need to be fun and exciting places for children, and it's healthy that an element of risk exists to encourage development and to prompt learning. It's important that the risk element is managed by ensuring that falls onto concrete happen less often. To prevent serious accidents from occurring, it is vital that an impact absorbing surface is present in all of Britain's playgrounds.**



## Useful websites

Association of Play Industries  
[www.api-play.org](http://www.api-play.org)

Royal Society for the Prevention of Accidents  
[www.rospa.com](http://www.rospa.com)

Register of Play Inspectors International  
[www.playinspectors.com](http://www.playinspectors.com)

Consumer Product and Safety Commission  
[www.cpsc.gov](http://www.cpsc.gov)

Federation of Sports and Play Associations  
[www.sportsandplay.com](http://www.sportsandplay.com)

BSI: British Standards Institution  
[www.bsigroup.com](http://www.bsigroup.com)

Matta Products  
[www.matta.co.uk](http://www.matta.co.uk)



## Glossary of abbreviations

**IAS**  
*Impact Absorbing Surface*

**CFH**  
*Critical Fall Height*

**FFH**  
*Free Fall Height*

**BSI**  
*British Standard Institution*

**BSEN**  
*British Standard European Norm*

**API**  
*Association of Play Industries*

**RoSPA**  
*Royal Society for the Prevention of Accidents*

**RPII**  
*Register of Play Inspectors International*

**CPSC**  
*Consumer Product and Safety Commission*

**FSPA**  
*The Federation of Sports and Play Associations*

**DDA**  
*The Disability Discrimination Act*

The information provided within this booklet is designed to offer a general information guide to choosing playground safety surfacing in the UK. It is not meant to be a replacement for professional advice. Sources from outside the UK have been used to demonstrate best practice when choosing Safety Surfacing. All information correct at time of press.

40% of accidents relate to equipment, with 80% of these resulting in falls to the surface.

Source: RoSPA





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