BSFH
play areas for children

... impact protection for play and leisure facilities, schools and kindergartens.

SAFETY ON ...



... PLAYGROUNDS

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Introduction

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Play value and safety aspects

The members of the Impact protection Committee of the Association of Playground Equipment and Leisure Facility Manufacturers have set themselves the goal of providing information on the essential quality criteria of impact protection products in parallel to the new DIN EN 1176-1: 2024-05 and DIN EN 1177: 2024-10.

Protection against serious injury is of decisive importance, especially on playgrounds. Tested and certified impact protection products of the companies organised in the BSFH guarantee excellent shock absorption and offer the greatest possible safety on playground facilities. The shock-absorbing properties of the impact protection represent an optimal combination of safety and suitability for everyday use. They allow an untroubled and creative playtime pleasure.

BSFH seal of approval for qualitative performance

The development of a child should be sensibly supported by parents, pedagogues and the social environment. In this context it is crucial how the „idea of childhood“ is understood and qualitatively filled out. Every person is unique; children develop with their own talents, inclinations, interests and also handicaps. They want to go their own way. To do so, they need competent, adult role models, loving and secure relationships and their own time for development.



The windows of development are particularly wide open in the first years of childhood. The time before school should be used to develop basic skills, so-called basic competences, free from school learning, on which school education and training can later build. These basic skills are by no means knowledge that can be isolated and verified, but together they form the foundation on which further and other elements of education and training can build.

The most important activity, the „work“ of the small child, is play. A healthy childhood means: stimulation, time and space to play. Through play, children experience and learn about the world. Attractive playgrounds and playground equipment promote child development. A child‘s everyday life is increasingly characterised by a lack of exercise and the resulting health impairments.

Exercise, play and sport are the central approaches to a comprehensive promotion of human and social development. Physical well-being and mental stability are increased, communication and social integration intensified.

The play value for the users is decisive for the quality of the play areas and equipment. Children should be confronted with the risks of life while playing. They should experience them, learn how to deal with them and thus acquire the tools to master risky situations in life. Possible injuries due to manageable and calculable residual risks, which are considered to be „sportive-playful risks“, are consciously accepted.

The impact protection under playground equipment is often neglected. In case of a fall, it is the last chance to avoid injuries. Experience shows that about every third fall injury on playgrounds is not prevented or mitigated because the impact protection has not been selected properly. Examples of commonly used shock-absorbing materials are listed in DIN EN 1176-1: 2024-05 Part 1 with the corresponding maximum possible free fall heights. For Germany, Table I.1 in Annex 1 applies instead of Table 4.

Shock-absorbing materials are tested under special conditions, therefore the functional properties of these materials may vary during use (e.g. in frost, rain or extreme heat). They should also be properly maintained, otherwise shock absorption can be significantly reduced.



Ground types depending on the permissible free fall heights

Ground material	Description	Minimum thickness of layer	Largest possible free fall height
Concrete / Stone			< 600 mm
Bitumen bonded surfaces			< 600 mm
Topsoil			< 1000 mm
Turf (Germany only)			< 1500 mm
Bark mulch	chips from the bark of coniferous woods, 20 mm to 80 mm corn size	200 mm 300 mm	< 2000 mm < 3000 mm
Wood chips	mechanically chipped wood (not derived from wood) without bark or leaves, 5 mm to 30 mm corn size	200 mm 300 mm	< 2000 mm < 3000 mm
Sand	0,2 mm to 2 mm corn size	200 mm 300 mm	< 2000 mm < 3000 mm
Gravel	2 mm to 8 mm corn size	200 mm 300 mm	< 2000 mm < 3000 mm
other materials or other layer thicknesses for instance: • Impact protection plates • In-situ impact protection • Artificial turf	according to HIC-test (comply with DIN EN 1177: 2024-10)		critical fall height as per certified

Guidelines for practice according to DIN EN 1176-1: 2024-05

Minimum thickness of layer: For loose fill material, add 100 mm to the minimum layer thickness to compensate for the playaway effect.

Sand and gravel: These should not contain silty or clayey particles. The particle size can be determined using the sieving method according to EN 933-1.

Safe falling as basic motor training

A guest contribution by Franz Danner, TÜV Süd Product Service GmbH

From the earliest childhood onwards, the human being has to overcome a steady series of developmental stages. In order to master these stages, a wide range of age-appropriate physical development also requires challenges that make failure conceivable. First to plan or to control. The smaller the children are, the more important the playground floor is for the functionality of a playground, just as important as the choice of equipment, soil modulation and planting. Besides the effect on the sensory-motor development of the children, the ground has an immense importance for the „safe“ course of play.
The soil requires experience. Both the mental and, after a large number of experiments, the physical or mental competence has adapted to such an extent that these situations can be mastered safely.



Whether climbing, running, jumping, balancing, such challenges often lead to a fall with smaller children. With increasing experience and age, the frequency of falls decreases. If the falls of small children are still very uncontrolled and surprising, children learn with increasing age to avoid falls, to foresee for which we plan play areas, the higher the demands on shock absorption are. Special attention must be paid here to the group of children under 3 years of age. must be able to cushion foreseeable falls to such an extent that no serious injuries or even permanent damage occurs. Nevertheless, bruises, abrasions or contusions are not avoidable or acceptable. Occasionally even a broken arm must be accepted. In order to support the motoric experiences of the children in the best possible way, a variety of different offers are necessary.

How do I walk on gravel, how do I have to roll on rubber floors, from which height can I jump down on wood chips without hurting myself? When does lawn become slippery? How does the ground change during the seasons? There is therefore not the one, best playground surface. Children can only acquire risk competence through a diverse range of soil types.

A sound basic motor training is the foundation for safe movement in our environment. It is the basic prerequisite for getting through life as safely as possible, whether in traffic, leisure, sport or work. The right choice and variety of floor coverings make an important contribution to this.

Description of the impact protection materials tested according to the HIC method

The protection against long-term and serious injuries is of crucial importance, especially on playgrounds.

Impact protection plates

Synthetic impact protection plates ensure excellent shock absorption and protection against serious head injuries. The shock absorbing properties offer an optimal combination of safety and suitability for everyday use. Regardless of weather and temperature, they allow untroubled playing pleasure.

ranges from standard products made of recycled rubber granulate bound with coloured polyurethane, to various design plates with different motifs such as numbers or smileys, to the EPDM plate e, whose surface layer consists of newly produced EPDM granulate. Depending on the maximum drop height of the playground equipment,



Depending on the maximum fall height of the play equipment, a corresponding product in a certain panel thickness can be selected. The decisive factor for the selection is that the maximum height of fall required for the play equipment must be shown in a certificate from a recognised testing institute. The spectrum of different qualities

a corresponding product in a certain plate thickness can be selected. The decisive factor for the selection is that the maximum fall height required for the play equipment must be shown in a certificate issued by a recognised testing institute. The spectrum of different qualities ranges from standard products made of recycled rubber granulate

bound with coloured polyurethane, to various design plates with different motifs such as numbers or smileys, to the EPDM plate e, whose surface layer consists of newly produced EPDM granulate. This sheet quality also offers a wide range of colours, plain or mixed colours in RAL gradations. This means there are virtually no limits to an architect's creativity. For example, it is possible to use highly hard-wearing ball game boards with shock-absorbing properties in sports and play areas. Synthetic rubber granulate sheets offer tested and constant impact protection. These are manufactured industrially with constant parameters. Therefore, they can be used both in indoor and outdoor areas. The installation and cleaning is easy and can be carried out without great expertise, because impact protection sheets are almost maintenance-free. In contrast to loosely poured impact protection such as sand or bark mulch, which has to be regularly raked, redistributed and, if necessary, filled up, the impact protection panels constantly retain their original thickness and thus the required impact protection properties. Contamination or dangerous objects such as shards are immediately visible and can be removed without difficulty.



Although the water-permeable PU-bonded elastomeric surfacing has a certain self-cleaning effect due to rainfall, heavy soiling such as airborne emissions or other impurities brought in from outside (soil, sand, leaves, etc.) should be removed with a standard street broom. If the area is affected by moss and algae formation due to shading of neighbouring bushes and trees or adjacent plant growth, the use of a high-pressure cleaner without chemical additives is recommended. It is important to ensure that the surface is not exposed to full water pressure. As a rule, this form of intensive cleaning is only due once a year. Strongly adhering residues can be dissolved with warm water and soapy water (highly diluted) and a soft brush, then rinse again with plenty of water. The areas of the panel joints must be regularly cleaned of any grass or moss.

If snow is to be cleared, it is essential to ensure that damage to the surface caused by sharp-edged or excessively heavy tools and equipment is avoided. The use of approved, commercially available de-icing salts does not damage the surface. As soon as weather conditions permit, the residues should be removed with a high-pressure cleaner.

Seamless impact protection floors „in-situ“

For decades, locally installed synthetic surfaces, in-situ, made of Polyurethane-bounded rubber granules, have proven themselves for sports facilities and highly frequented playgrounds. Poured in place synthetic safety surfaces do not require a bounded base layer, such as asphalt or concrete. Instead, a mineral aggregate base layer is sufficient, which has to be compacted and installed at the correct height and profile, to be resistant to deformation and against shearing. The use of edge stones or rubber curbings are highly recommended.

and logos or themes, such as land and water designs etc., which provide even more playful benefits. Although PUR-bounded synthetic safety sufaces are mainly used as water-permeable systems in outdoor areas, the implementation of the poured in place surfaces for indoor areas is increasing. For these kind of projects, special construction methods such as water impermeability, further requirements regarding to the flammability, slip resistance, hygiene and resistance to high point loads, can be realised in addition to the standard desired protective properties.



Seamless synthetic safety surfaces are slightly more expensive to purchase than conventional bulk materials, but the purchase costs are amortized after just a few years. In contrast to sand, gravel or bark mulch, the seamless PUR-bounded synthetic surfaces are weather-resistant and only need to be cleaned superficial.
This eliminates the so-called „playing-away-effect“, according to a necessary refilling of worn areas. In addition, the seamless synthetic surfaces are particularly suitable for barrier-free playground areas. Due to their smooth surface, they can also be easily accessed by wheelchair users. For a long lifetime of the surface, a regular intensive wet cleaning is recommended.

The safe use, even under adverse weather conditions combined with low cleaning and maintenance expenses as well as many years of consistent usability, make the poured in place safety surface systems the ideal supplement for highly frequented children‘s playgrounds. They are also resistant against conventional de-icing salt, useable for snow-covered playground areas. In addition to the colour variations, there are attractive and multiple design possibilities within the synthetic surface top layer, for example with lines, hopscotches, illustrations, letterings, numbers





In order to offer planners and architects a high level of creative possibilities by designing a playground concept, the water-permeable safety surface can be produced in many different colours and colour combinations as well as illustrations. They can be installed on even surfaces, as well es on inclined, curved and sloped surfaces.
In general, the product consists of two layers: The upper top layer is made of high-quality, completely new produced EPDM granules (rubber). The necessary elasticity is provided by the supporting base layer made of recycled rubber material. The thickness of the base layer depends on the critical fall height of the playground equipment. The complete and certified synthetic safety surface system is installed directly on site, using the so-called „in-situ" or "poured in place" installation method. The seamless system adapts perfectly to all corners, edges and unevenness on site. After approximately 24 hours the synthetic surface is cured and can therefore be walked on. The seamless synthetic surfaces are almost maintenance-free.

Wood chips

The use of wood chips as natural impact protection material has increased significantly in recent years. They have clear advantages over other loose bulk materials. Clearly not all wood is the same and the various products differ not only in shape and colour. It is the case that the choice of wood, production method and the structure of the finished material all lead to different product properties and possible uses, and to differences in the quality.

When looking for suitable wood chips for impact protection one finds ordinary fresh wood chips, often just called wood chips or chippings. This material is usually a by-product of recycling fresh trunk wood. It often has a considerable proportion of bark and overlengths and is mostly employed for thermal utilization or in the chipboard and paper industries. Even blocks of sawmill waste or chippings from landscape conservation measures have been used as purported impact protection material.

These materials do not fall under the standardized designation „wood chips“, as they do not comply with the specifications of DIN EN 1176-1: 2024-05 and the relevant safety requirements.

However, there are also differences in the case of wood chips for impact protection. For example, the fresh wood chips generally available on the market are usually in the form of flakes and are made from fresh wood. Due to their high moisture content, they are not very durable, lie flat on top of each other and sometimes even have sharp-edged cut surfaces. In contrast, there are also wood chips that are made from dry wood and have an elongated structure. It is safe to assume that material of this kind has a durability of at least eight to ten years. A simple refill to maintain the required layer height is sufficient. Complete replacement of the layer is not necessary for many years.





Wood chips with this structure can interlock and therefore form a more uniform surface, guarantee a pleasant, even and anti-slip tread and are not so easily displaced in the course of play. The surfaces dry quickly after precipitation and are clean to play on. This material can also be used on low slopes. There is no puddle or ice formation. Even in frost, the material retains good impact protection properties. This means that these surfaces can be used in all weathers and all seasons.

The various colours available for wood chips provide plenty of scope for creative ideas: whether for the design of themed playgrounds, the demarcation of individual areas, or a guidance system for visually impaired people - colour can be used to set clear accents. The installation of these wood chips is very simple: excavate the area to be laid out, install a layer of natural stone gravel approx. 10 cm thick as drainage, and spread the required thickness of wood chips directly onto the gravel. The costs for fleece as a separation layer can be saved here. Unlike many other products, these wood chips do not require a layer of fleece and this would in fact have a negative effect on durability.

Barrier edging is not usually necessary, even on slopes. Due to their low weight, wood chips are also very suitable for installation by the customer, e.g. for Parent Actions and Campaigns in kindergartens and schools. Thanks to the uncomplicated installation, any desired shape of impact protection surface can be created quickly and easily or existing areas extended. The material fits perfectly into a natural environment.

The care and maintenance of these impact protection surfaces is equally unproblematic. Areas that no longer have the required fill level can be filled in. Unevenness occurring in the course of play can simply be levelled out again. Autumn leaves can be removed by a leaf blower.

The special structure of shredded wood chips offers a comfortable walking surface similar to that of a forest floor. This natural shock absorption is not only easy on the back and joints but on the entire musculoskeletal system. The material is therefore not only suitable for use on playgrounds in public areas, in schools and kindergartens, in amusement parks and on camping sites etc., but also in

many areas of sport and fitness, such as outdoor Finnish tracks, fitness stations, fitness circuits, walking tracks and playing fields.

In view of the many different types of (wood) chips that are available on the market, it is worthwhile taking a closer look. The differences in quality and resultant potential uses are greater than it seems at first glance. This also applies to the certificates for these materials. Wood chip test reports presented by manufacturers refer only to a one-off laboratory test of the impact protection values and refer exclusively to the actual material submitted for testing.

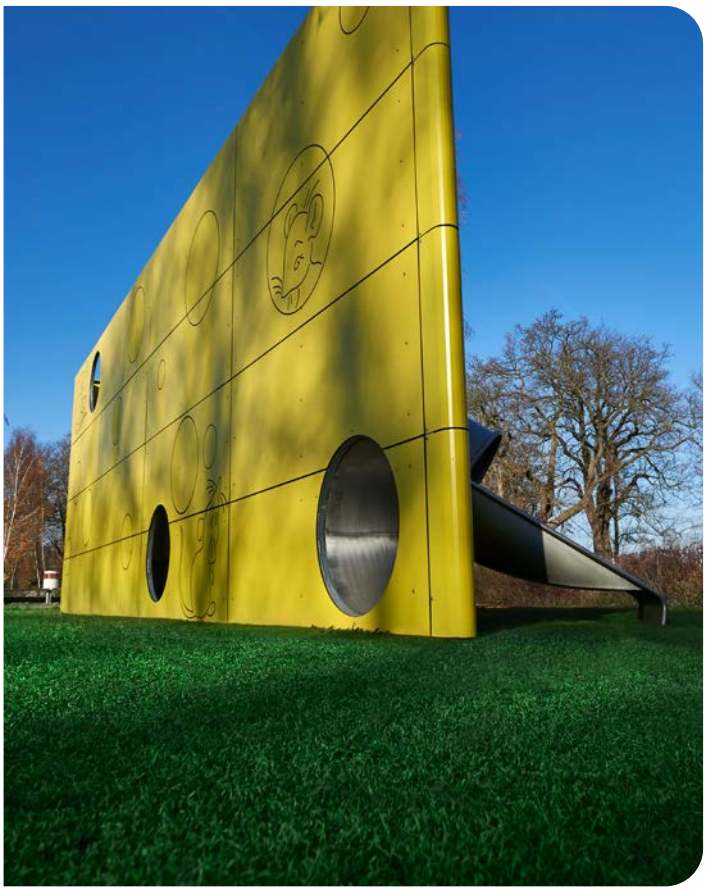
Only if a certificate has been issued for the material does it prove that the production site has been inspected and that the material submitted for laboratory testing really was produced in the current manufacturing process. The required layer heights of the material tested in relation to the critical drop height are given in the test report.

As untreated wood chips consist of 100 per cent natural material, their disposal is unproblematic. Wood chips that are no longer required can simply be used as mulch or composted.



Artificial turf

Artificial turf can also be used as modern impact protection with a natural look. Artificial turf offers planners as many design options as conventional impact protection surfaces. Additionally, this option is easy-care, service reduced and has no play-off effects. If the surface should appear as natural „green“ as possible, a texturized artificial turf in two different shades of green is used, which visually hardly differs from natural grass. For colorful options e.g. blue artificial turf versions or inlays in form of bouncy games or graphics are available.



Also overheating is no longer an issue due to technological innovations, such as the „CoolPlus function“ – a development which is related to the use of artificial turf in professional football. Artificial turf systems, as used in sports such as football, hockey or rugby, are structured differently depending on the desired properties: They are available with and without infill, which is made up of sand and EPDM granulate.

In general, the systems are easy to maintain and can be used without restrictions and without loss of quality. Due to their water permeability, puddles do not form on the pitch even with heavy rainfall. Like the locally installed synthetic surfaces made of PU rubber granulates, impact protection systems with artificial turf have optimum impact protection properties. They do not require a bonded substructure of asphalt or concrete. The two-layer structure, consisting of an elastic base layer and the artificial turf surface layer, is responsible for the optimum protection properties. However, to avoid tripping hazards and to protect against vandalism, edging should be used. Impact protection systems with artificial turf are less expensive than jointless synthetic impact protection floors made of PU rubber granulate, but somewhat more expensive than conventional bulk good. Nevertheless, the purchase costs are amortized after a few years. In contrast to sand, gravel or bark mulch, artificial turf systems are as far as possible weather-proof and rot-resistant and only need to be cleaned superficially – and not from deep-lying dirt. Additionally, the shock-absorbing effect is retained even at wet conditions, in contrast to many bulk materials.

The artificial turf infills consisting of sand or EPDM granulate weighs down the artificial turf and protects it from damages by cigarettes or other hot objects. The base layer made of recycled rubber material provides the required elasticity. The thickness of this layer varies depending on the critical fall height of the playground equipment. The base layer is installed directly on site using a jointless, so-called in-situ installation method. The artificial turf is adapted afterwards to the prevailing conditions and laid directly on the base layer.

For a long service life an annual cleaning is recommended, during which the infill granulate is also re-filled. However, the quantities are very small compared to bulk material.

Impact protection for play and leisure facilities from the perspective of a planner and landscape architect

A guest contribution by Lothar Köppel, landscape architect

Gravity is a physical force that is difficult for us to escape. This also applies to the use of play and leisure facilities.

When planning playgrounds and open spaces for playing, play equipment and playground facilities are usually also planned and used. However, it is not enough to simply put them on a „greenfield site“, but further considerations / planning must be made what kind of impact protection is required. The DIN EN 1176-1: 2024-05 / 1177: 2024-10 standards describe corresponding safety requirements for playground equipment and shock-absorbing floors in public areas. In purely private areas it is recommended to observe them, but in contrast to public areas it is not mandatory.

When selecting a suitable impact protection floor, there are now various criteria that must be weighed up during the planning stage, taking into account

„functionality paired with design“.



What should be taken into account during planning?

- If equipment or facilities are planned for play, the top priority from a safety point of view is the shock-absorbing property of the planned floor in accordance with Table I.1 in Annex 1 of DIN EN 1176-1: 2024-05, depending on the planned free fall height in relation to the planned play equipment. Here the so-called HIC value determines the shock-absorbing property of the floors. When planning, it is important that the floor used under the play equipment fulfils the required criteria for impact protection.

- When planning playgrounds and open spaces for playing, natural resources can be incorporated into the play area as part of the holistic design. The location should be taken into account.
  Example:

- In parks and public recreational facilities, it is possible to close to nature. Topsoil, lawn, bark mulch, wood chips, sand or gravel could be used here.

- For elaborately designed or artistically modelled floor surfaces, synthetic impact protection with, for example, coordinated colouring or motifs is particularly suitable.

- In pedestrian areas and on squares with an urban character, floor coverings made of concrete, paving and asphalt are also suitable, but only for play equipment/facilities with a low fall height up to ≤ 60 cm.

- For fall heights > 60 cm, impact protection slabs or PU-bound impact protection coverings in local installation are more suitable. The planning can then react to the urban design with regard to the road surfaces.



- The visual appearance, i.e. the colour of the impact protection material, also plays an important role in the planning concepts. Coloured materials give the play areas an architectural character with a signal effect. This is contrasted by the optical effect of natural-coloured materials. However, the colour scheme is of decisive importance in the barrier-free design of play areas, as the coloured design can be part of a guidance system.

- Impact protection is of great importance in the barrier-free design of play areas, because barrier-free public playgrounds will become standard in the future due to the laws on equal opportunities for the disabled (BGG). Impact protection surfaces have a signal character due to their colouring (optics/vision) and their elasticity (haptics/keys/feelings). This represents the so-called two-senses principle; two senses must be addressed during use. The use of rolling aids (wheelchair/rollator/stroller etc.) should be taken into account. In barrier-free guidance systems, colored impact protection areas also signal danger zones and are therefore a safety element with signal character (two-sense principle).

- The combination of different impact protection materials is also possible and usually makes sense. For example, the approach area and the extended impact protection area can be designed with different flooring while maintaining the prescribed shock absorption. The design of the play area is upgraded and can be part of a guidance system. Thus the impact protection surface has a multifunctional effect. When combining different impact protection materials, especially with loose materials, the „running into each other“ should be prevented by appropriate constructive measures in order to reduce the maintenance effort and to guarantee the properties of the impact absorption of the floors as permanently as possible.

- When planning impact protection surfaces, however, other criteria should also be taken into account. Synthetic safety surfaces or safety tiles have the advantage that they are easy to clean. Bulky materials such as sand, gravel and bark mulch are often contaminated by dogs and cats and require more complex maintenance work in terms of hygiene.

- Wood mulch with bark or moist fresh bark mulch is an inexpensive impact protection material. The disadvantage of these materials is that they rot or smear very quickly and fungal cultures or moulds can settle. Preventive herbicide use against this is prohibited on playgrounds because of the possible health damage to users. When using this impact protection material, regular replacement must be planned.



- Impact protection materials and surfaces should also be assessed for their environmental compatibility. Also consider the reuse of impact protection material when planning. Can the impact protection surfaces and materials used be recycled or, if necessary, reused in other ways will be. Here, bulk materials and impact protection plates have a clear advantage over locally cast impact protection coverings, which usually have to be disposed of more expensively. Bulk materials can be cleaned or used for other purposes. Rubber sheets can often be reinstalled if they are not damaged.

- When using bulk materials such as sand and gravel, it must be taken into account during the planning stage that these are entered via the entrances to buildings such as schools and kindergartens. This is especially true if they were installed close to the building. This also applies, for example, to water-bound path surfaces, such as sand paths, which lead directly into building entrances.

- Another problem with the use of impact protection sand as impact protection material is that it is also used as play sand. Thus, conflict is pre-programmed when children play in sand in impact protection areas. It would therefore be better to use other, only limited playable materials as impact protection. It is therefore recommended to plan pure sand play areas.

- When planning impact protection areas, the costs also play a decisive role. Impact protection surfaces made of bulk materials are usually much cheaper to purchase and install than industrially manufactured impact protection products. However, they require a higher care and maintenance effort.
  In principle, financial resources should be planned for the care and maintenance of impact protection surfaces.



In summary, the following can be stated:

Falling due to gravity is an essential part of playing. Children must learn to deal with the risk while playing. Children‘s playgrounds must not be considered „fully cascaded areas“, because according to statistics, at present the way to the playground is more dangerous than playing in the playground. A high safety contribution is made here by correctly planned or selected impact protection flooring materials.



In the planning phase, however, the above-mentioned advantages and disadvantages of impact protection surfaces should always be examined and weighed up. In addition to the safety aspects, an interesting and attractive design of playgrounds plays a decisive role in the planning phase. Topographical specifications such as hollows, hills and ground modelling can result in scenically interesting boundaries, e.g. for loose materials without elaborate edging. Professional, comprehensive planning creates quality in playgrounds, enables play value and valuable play processes, guarantees safe use and optimises design requirements.

DIN EN 1177: 2024-10 (impact attenuating playground surfacing – methods of test for determination of impact attenuation)

A guest contribution by Dennis Frank, ISP GmbH

The various types of safety surfacing differ in terms of cost, minimum installation thickness as well as cleaning and maintenance requirements. It should be noted that the most important property of these surfaces is their safety-related impact attenuation. This is the property of the playground surface that dissipates the impact energy generated when a child falls from a play equipment. In this way, a critical – that is, life-threatening – injury to the falling child is largely ruled out. The impact-attenuating properties are determined by measuring the critical value in accordance with DIN EN 1177: 2024-10 (Impact-attenuating playground surfacing – Test methods for determining impact attenuation, German version of standard EN 1177: 2024-05).

Here, a distinction is made between two methods of impact testing. The first method is used to determine the critical drop height to enable a complete and detailed verification of the product's suitability range. In this case, a test specimen of the impact attenuating floor material under test is subjected to a series of impacts from a test head fitted with measuring instruments, at various specified drop heights. The signal emitted during each impact by the accelerometer located on the test head is evaluated to indicate the severity of the injury based on the measured impact energy, defined as the head injury criterion (*abbreviated as HIC). The HIC and gmax values for each impact are recorded, and the critical drop height is determined as the lowest drop height that produces an



HIC value of 1000 or a gmax value of 200. The appropriate impact attenuating surfacing is then selected depending on the intended playground equipment and its free fall height. The second procedure describes an on-site case test which provides the necessary proof of the suitability of the surfacing for the specific site (taking into account the specified free-fall height of the installed play equipment) at the time of the test. The basis of any suitability assessment should be a test report from an ISO 17025 accredited testing institute or testing laboratory. This ensures qualification, verification, and comparability. In accordance with the strict requirements of standard EN 1177: 2024-10, the test report must contain the following information:

- the number and date of issue of this European Standard, i.e. EN 1177: 2024-10;
- a full description of the product tested;
- a photograph of the material tested, specifying the scale in the case of loose bulk materials;
- the method used to hold the test specimens together, or the internal dimensions of the test vessel and the tested coating thickness in the case of loose bulk material;
- a diagram showing all test positions;
- the properties of the ground at the time of the test (e.g. temperature and humidity);
- the results of each drop test, specifying the drop heights used and the corresponding HIC and gmax values;
- the critical fall height of the tested soil, expressed in metres to two decimal places
- the graphs of the HIC value and gmax value against the drop height, on the basis of which the critical drop height of the floor was determined;
- a time/acceleration curve for an impact with an HIC value or gmax value.

It should also be noted that this standard is regularly revised and republished. Test reports intended to demonstrate the suitability of the fall protection system should always correspond to the current date of issue of the EN 1177: 2024-10 standard.

Cleaning and care

A guest contribution from Christoph Mayer-Klenk, Sandmaster GmbH

Sand cleaning – stands for sustainable action and cost savings

Countless sandy areas provide children with playgrounds, sportspeople with diving pits or beach volleyball courts. It ensures fun for everyone. But to ensure that this is not impaired, the sand quality must be maintained.

Simple exchange of the sand is the most common way to ensure it. On the one hand we must keep the costs in mind, which are more expensive than the cleaning, and on the other hand the impact it has on our environment. For the removal of the “old” sand, as well as the supply of the new sand, dozens of trips with large trucks are required. These additionally burden our cities with harmful emissions.

But how can sand cleaning avoid replacement of it? To be able to understand this, you need to know what happens to the sand. Sand hast the characteristic of hardening over time, and if it is not drained, a foul odour can develop, so there is neither safety nor hygiene for the users.



This is where the sand cleaning comes in - the sand, contaminated by all environmental influences, is cleaned and loosened with a proven sand cleaning procedure. By fine sieving with the help of a special steep sieve, dirt contributions as broken glass, leaves, cigarette butts and even animal excrement up to size of approx. 8 mm are removed. In addition, the sand is loosened and aerated by the deep cleaning process to a depth of up to 40 cm (depending of the depth of the sand filling). This also ensures the fall protection, stabilises the acid value and removes unpleasant odours. If required, a depth measurement method can be used to provide proof of the cleaning depth, which is documented and logged during the cleaning process. Even biological agents against animal excrements can be applied on request.

Synthetic floor cleaning

But not only sand is cleaned, numerous synthetic floors are also “getting dirty”. Whether running tracks, run-up tracks, multi-sport grounds or playgrounds with synthetic floors, all areas are exposed to daily environmental influences and usage, and require regular maintenance.

The cleaning process for open-pored synthetic floors, provides cleaning with the help of high pressure and rotating nozzles deep into the pores, especially in order to combat moss and algae formation, which are promoted by constant environmental influences. With regular cleaning, however, fall protection through the elastic properties and the safety of the sportspeople through a non-slip surface are regained.

Overview of the advantages and disadvantages of different materials of impact attenuation

Concrete	· Low maintenance costs	· Heavy exposure on joints · Abrasions, higher risk of bruises · Broken bones and heavy head injuries
Asphalt	· Low maintenance costs	· Heavy strain on the joints · Abrasions, higher risk of bruising · Broken bones and severe head injuries
Earth	· Low purchase costs and · Low maintenance costs	· Frequent ponding · Difficult to define fall protection properties
Clay	· Low purchase costs and · Low maintenance costs	· Frequent ponding · Difficult to define fall protection properties
Turf	· Moderate purchase costs	· Higher maintenance costs · Not very resistant
Sand	· Moderate purchase costs	· Displacement effect (inconstant thickness of layer) · Wet sand densifies and loses shock absorption · Ponding after rain, hard frozen in winter · Impurities are poorly visible · Regular cleaning required · Abrasive effect on equipment posts · Abrasive effect on floors in schools and kindergarten · Not accessible with wheelchairs
Round gravel	· Moderate purchase costs	· Displacement effect (inconstant thickness of layer) · Impurities are poorly visible · Slip hazard in adjacent areas · Stones can be thrown · Disadvantageous for lawn mowers · Not accessible with wheelchairs · Some sorts tend to harden extremely
Bark mulch	· Moderate purchase costs · Natural material	· Displacement effect (inconstant thickness of layer) · Impurities are poorly visible · Rapid rotting · Dirty and greasy in the rain · Possibility of fungal infestation
Fresh wood chips	· Moderate purchase costs · Natural material	· Displacement effect (inconstant thickness of layer) · Impurities are poorly visible · Refilling required · Only limited access for vehicles
Wood chips dry and shredded	· Moderate purchase costs · Natural material · Colour design possible	· Displacement effect (inconstant thickness of layer) · Refilling required · Slow process of rotting
Artificial turf	· Consistent impact protection · Very resistant · Colour design possible	· Higher procurement costs · Defined substructure required · Infill granulate possibly required · Reparations are expensive
Impact protection plates	· Consistent impact protection · Very resistant · Colour design possible	· Higher procurement costs · Defined substructure required · Seams may allow dirt and vegetation
Seamlessly applied impact protection coverings	· Consistent impact protection · Very resistant · Colour design possible	· Higher procurement costs · Defined substructure required · Reparations are expensive

The following companies in the Impact protection Division provide further information:

Bermüller & Co GmbH

Rotterdamer Straße 7; 90451 Nürnberg
Telephone: (0911) 642000, Fax: (0911) 6420090
Internet: www.beco-bermueller.de
Federal state: Bayern, **Year of foundation**: 1960
Legal form: GmbH
Management: Stefan Bermüller
Product range: Pegasoft impact protection surfaces, Regum moulded parts

Conradi+Kaiser GmbH

Gewerbegebiet Larsheck, 56271 Kleinmaischeid
Tel.: (02689) 9580-0, Fax: (02689) 9580-50
Internet: www.conradi-kaiser.com
Federal state: Rheinland-Pfalz, **Year of foundation**: 1987
Legal form: GmbH
Management: Sabrina Kaiser, Sebastian Groesslhuber
Product range: Shock-absorbing flooring systems for playgrounds with a fall height of up to 3 meters and multisport facilities, jumping games, interlocking pavers, rubber granule boundary systems, traffic calming measures and curb ramps, balls, cubes, and play elements for toddlers

HET Elastomertechnik GmbH

Hagenauer Straße 53, 65203 Wiesbaden
Telephone: +49 (0) 611 50402910, Fax: +49 (0) 611 50402930
Internet: www.het-group.com; info@het-group.com
Federal state: Hessen, **Year of foundation**: 1991
Legal form: GmbH
Management: Jean-Pierre Frottier
Product range: Impact protection slabs made of environmentally friendly recycled rubber granulate for fall heights of up to 3 m, motif slabs, bouncy games, ball game slabs, interlocking paving, edge trims, covers, rubber palisades

ISP GmbH
Institut für Sportstättenprüfung

Amelunxenstr. 65, 48167 Münster
Telephone: +49 (0) 2506 30 77 000, info@ISP-Germany.com
Internet: www.isp-germany.com
Federal state: NRW, **Legal form**: GmbH
Contact person: Dennis Frank
Product range: Testing of the following areas: sports and leisure facilities (synthetic surfaces, synthetic turf systems), sports halls (sports hall floors, impact protection walls, ceiling cladding, lighting), playgrounds (impact protection surfaces)

Köppel Landschaftsarchitekt Planungsbüro

Katharinenplatz 7, 84453 Mühldorf a.Inn
Telephone: +49 (0) 8631 988851, Fax: +49 (0) 8631 988790
Internet: www.la-koeppel.de
Federal state: Bayern, **Year of foundation**: 1980
Management: Barbara Grundner-Köppel (office manager) u. Lothar Köppel
Object planning, consulting and assessment for barrier-free consulting activities regarding barrier-free accessibility

Kraiburg Relastec GmbH & Co. KG

Fuchsbergerstr. 4, 29410 Salzwedel
Telephone: +49 (0) 8683 701201, Fax: +49 (0) 8683 7014201
Internet: www.kraiburg-relastec.com; info@kraiburg-relastec.com
Federal state: Sachsen-Anhalt, **Year of foundation**: 1991
Legal form: GmbH & Co. KG
Management: Roland Burreiner
Product range: EUROFLEX® Shock-absorbing Floor Systems for Playgrounds up to 3m height of fall and multi sports facilities, motif boards, interactive bouncing games, interlocking pavements, rubber palisades, balls, cubes, interactive animals and various accessories

Öcocolor GmbH & Co. KG

Hemkenroder Straße 14, 38162 Destedt
Telephone: +49 (0) 5306 941444, Fax: +49 (0) 5306 941445
Internet: www.oecocolor.de; info@oecocolor.de
Federal state: Niedersachsen, **Year of foundation**: 1997
Legal form: GmbH & Co. KG
Management: Katrin Pogan
Product range: Öcocolor wood chips for use as certified impact protection material for fall heights up to 3 m, playground and football field surfaces, path and track surfaces as well as for landscaping

PolyPlace GmbH

Niedergeorgswerder Deich 196, 21109 Hamburg
Tel.: 040 226335070
Internet: www.polyplace.de
Federal state: Hamburg, **Year of foundation:** 2017
Legal form: GmbH
Management: Kai-Peter Schlatermund
Product range: Flooring for play and sports areas, fall protection solutions, planning and expert consultation, installation and maintenance of recreational facilities, plastic cleaning, tree pits, seamless and PU-bonded pathway surfacing

POLYTAN GmbH

Gewerbering 3, 86666 Burgheim
Telephone: +49 (0) 8432 870, Fax: +49 (0) 8432 8787
Internet: www.polytan.de; info@polytan.com
Federal state: Bayern, **Year of foundation**: 1969
Legal form: GmbH
Management: Gregor Gaisböck, Mathias Schmidt
Product range: Planning, consulting, installation and service of Artificial turf systems, synthetic sports surfaces and in-situ fall protection surfaces

PROCON Play & Leisure GmbH

Van-der-Reis-Weg 11, 59590 Geseke
Telephone: +49 (0) 2942 97510, Fax: +49 (0) 2942 975120
Internet: www.procon-gmbh.com; info@procon-gmbh.com
Federal state: NRW, **Year of foundation**: 1998
Legal form: GmbH
Management: Reinhard Bojahr, Benno Bojahr
Product range: Synthetic playground- and sports surface solutions for outdoor and indoor areas, Safety surface products, Playground surface and equipment inspection services, 2 certified Playground Inspectors according to EN and ASTM Standards (CPSI), Consulting service for planners and architects, Installation and maintenance works

Regupol BSW GmbH

Am Hilgenacker 24, 57319 Bad Berleburg
Telephone: +49 (0) 2751 8030, Fax: +49 (0) 02751 803109
Internet: www.regupol.com; info@regupol.de
Federal state: Nordrhein-Westfalen, **Year of foundation**: 1954
Legal form: GmbH
Management: Rainer Pöppel
Product range: safety surfaces and elements for playgrounds, leisure facilities, golf courses, etc., impact protection slabs, Playfix the jointless impact protection, elastic mats, elastic composite paving, sandpit edgings, palisades, etc., synthetic sports facility surfaces for indoor and outdoor use, gym and sports mats

SANDMASTER
Gesellschaft für Spielsandpflege und Umwelthygiene mbH

Heinrich-Otto-Str. 22, 73240 Wendlingen
Telephone: +49 (0) 7024 80590-15, Fax: +49 (0) 7024 8059020
Internet: www.sandmaster.de; info@sandmaster.de
Federal state: Baden-Württemberg, **Year of foundation**: 1991
Legal form: GmbH
Management: Christoph Mayer-Klenk
Product range: Cleaning and maintenance of playgrounds and sports fields

TÜV SÜD PRODUCT SERVICE GMBH

TÜV SÜD Product Service GmbH
Sylvesterallee 2, 22525 Hamburg
Telephone: +49 (0) 40 840521304, Fax: +49 (0) 40 840521399
Internet: www.tuev-sued.de
Federal state: Hamburg,
Legal form: GmbH
Contact person: Dr. Martin Rempfer
TÜV SÜD Product Service has stood for the highest level of competence in product testing for over 20 years. TÜV SÜD's well-known test marks indicate safety, reliability and quality. They show that your playground meets not only the legal requirements but also the increasing demands of consumers.

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ABC-TEAM Spielplatzgeräte GmbH

Eisensteinstraße, Industriegebiet Rohr, 56235 Ransbach-Baumbach
Telephone: +49 (0) 2623 800745, Fax: +49 (0) 2623 800737
Internet: www.abc-team.de
Federal state: Rheinland-Pfalz, **Year of foundation**: 1982
Legal form: GmbH
Management: Ayca Mehlig, Mario Mehlig
Product range: playground equipment / play cities and. Play villages, slides, swings, rocking animals, climbing walls, wobble bridges, cable cars, carousels, seesaws, sandboxes, mud pits, play tables, benches, waste baskets, elastic boards, table tennis tables, basketball stands

Berliner Seilfabrik GmbH & Co.

Lengeder Str. 4, 13407 Berlin
Telephone: +49 (0) 30 4147240, Fax: +49 (0) 30 41472433
Internet: www.berliner-seilfabrik.de
Federal state: Berlin, **Year of foundation**: 1865/1995
Legal form: GmbH & Co.
Management: Karl Heinz Köhler, David Köhler
Product range: playground equipment, rope playground equipment, climbing equipment, Net landscapes, complete playground equipment with devices

eibe Produktion + Vertrieb GmbH & Co. KG

Industriestraße 1, 97285 Röttingen
Telephone: +49 (0) 9338 890, Fax: +49 (0) 9338 89199
Internet: www.eibe.de
Federal state: Bayern, **Year of foundation**: 1969
Legal form: GmbH & Co.
Management: Tilo Eichinger
Product range: Playground complete equipment with devices e.g. seesaws, slides, wobble bridges, barrel and carousels, complete kindergarten equipment, large leisure facilities, skateboard ramps, playground equipment, fall protection, handicapped accessible playground equipment, combination facilities, sand and water playground equipment, trim and seal equipment, children's sports equipment.

espas GmbH

Graf-Haeseler-Straße 7-9, 34134 Kassel
Telephone: +49 (0) 561 5746390, Fax: +49 (0) 561 5746399
Internet: www.espas.de
Federal state: Hessen, **Year of foundation**: 2005
Legal form: GmbH
Management: Holger Aukam
Product range: Playground equipment

Eurotramp Trampoline - Kurt Hack GmbH

Zeller Straße 17/1, 73235 Weilheim a. d. Teck
Telephone: +49 (0) 7023 94950, Fax: +49 (0) 7023 949510
Internet: www.eurotramp.com
Federal state: Baden-Württemberg, **Year of foundation**: 1960
Legal form: GmbH
Management: Dennis Hack, Johannes Maier
Product range: high-quality trampolines for playgrounds, kindergartens and professional sports

Hags-mb-Spielidee GmbH

Hambachstraße 10, 35232 Dautphetal-Allendorf
Telephone: +49 (0) 6466 91320, Fax: +49 (0) 6466 6113
Internet: www.hags.de
Federal state: Hessen, **Year of foundation**: 1982
Legal form: GmbH
Management: Matthias Biek
Product range: playground equipment, outdoor fitness equipment, multi-sport facilities, park furniture, shading systems, consulting, planning, execution and installation from one source

SPOGG Sport Güter GmbH

Schulstraße 27, 35614 Asslar-Berghausen
Telephone: +49 (0) 6443 811262, Fax: +49 (0) 6443 811269
Internet: www.hally-gally-spielplatzgeraete.de
Federal state: Hessen, **Year of foundation**: 1986
Legal form: GmbH
Management: Camilla Grebe
Product range: Hally-Gally playground equipment

Ing. Karl Hesse Spielgeräte GmbH & Co. KG

Warteweg 36, 37627 Stadtoldendorf
Telephone: +49 (0) 5532 2066, Fax: +49 (0) 5532 1786
Internet: www.hesse-spielgeraete.de
Federal state: Niedersachsen, **Year of foundation**: 1906
Legal form: GmbH & Co. KG
Management: Michael Ludwig
Product range: playground and leisure equipment made of wood and steel, parking equipment,
municipal supplies: flagpoles, aluminium display cases

HUCK Seiltechnik GmbH

Dillerberg 3, 35614 Aßlar-Berghausen
Telephone: +49 (0) 6443 83110, Fax: +49 (0) 6443 831179
Internet: www.huck-seiltechnik.de
Federal state: Hessen, **Year of foundation**: 1993
Legal form: GmbH
Management: Stefan Huck, Wolfgang Keiner, Valentin Huck
Product range: rope play and climbing equipment, climbing nets, net bridges and tunnels, ladders and ropes, rope play courses, hammocks, barrier-free play equipment, original HUCK Vogelnest® swings, sun protection systems

KLETTERMAX GMBH

Gewerbegebiet, 19374 Domsühl
Telephone: +49 (0) 38728 20012, Fax: +49 (0) 38728 20017
Internet: www.spielplatzgeraete.de
Federal state: Mecklenburg-Vorpommern, **Year of foundation**: 1993
Legal form: GmbH
Management: Renè Arnhold
Product range: playground equipment;
leisure facilities for young people and adults;
custom-made products for interactive facilities;
green roofs

Playground + Landscape Verlag GmbH

Celsiusstraße 43, 53125 Bonn
Telephone: +49 (0) 228 68840611, Fax: +49 (0) 228 68840629
Internet: www.playground-landscape.com
Federal state: Nordrhein-Westfalen, **Year of foundation**: 2008
Legal form: GmbH
Management: Thomas R. Müller
Product range: International trade magazine
PLAYGROUND@LANDSCAPE

PLAYPARC Allwetter-Freizeitanlagenbau GmbH

Zur Kohlstätte 9, 33014 Bad Driburg
Telephone: +49 (0) 5253 405990
Internet: www.playparc.de
Federal state: Nordrhein-Westfalen,
Legal form: GmbH
Management: Siegfried Strasser, Steffen Strasser
Product range: children's playground equipment made of wood and steel, fitness equipment for public areas, sports and play equipment for all generations, calisthenics equipment, spare parts, planning, consulting and design

Sport-Thieme GmbH

Helmstedter Straße 40, 38367 Grasleben
Telephone: +49 (0) 5357 18181, Fax: +49 (0) 5357 18190
Internet: www.sport-thieme.de
Federal state: Niedersachsen, **Year of foundation:** 1949
Legal form: GmbH
Management: Maximilian Hohe
Product range: Complete equipment for playgrounds, playgrounds, exercise areas and outdoor fitness facilities, sports and exercise equipment for schools, kindergartens and associations. Consulting and installation service.

Stilum

Gewerbegebiet Larsheck, 56271 Kleinmaischeid
Tel.: 02689 92790-0, Fax: 02689 92790-29
Internet: www.stilum.com
Federal state: Rheinland-Pfalz, **Year of foundation:** 2005
Legal form: GmbH
Management: Sabrina Kaiser
Product range: Fall Protection Products and Playground Equipment

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