SVENSK STANDARD
SS-EN 1177:2018

Fastställd/Approved: 2018-01-17
Publicerad/Published: 2018-01-19
Utgåva/Edition: 3
Språk/Language: engelska/English
ICS: 97.200.40

Stötdämpande ytbeläggning för lekplatsen – Bestämning av kritisk fallhöjd

Impact attenuating playground surfacing – Methods of test for determination of impact attenuation

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka
Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet
Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standard-paket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete
Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.

Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence
As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work
We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception
With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00

Europastandarden EN 1177:2018 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 1177:2018.

Denna standard ersätter SS-EN 1177:2008, utgåva 2.

The European Standard EN 1177:2018 has the status of a Swedish Standard. This document contains the official version of EN 1177:2018.

This standard supersedes the Swedish Standard SS-EN 1177:2008, edition 2.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Lekredskap, SIS/TK 379.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1177

January 2018

ICS 97.200.40

Supersedes EN 1177:2008

English Version

Impact attenuating playground surfacing - Methods of test for determination of impact attenuation

Sols d'aires de jeux absorbant l'impact - Méthodes d'essai pour la détermination de l'atténuation de l'impact

Stoßdämpfende Spielplatzböden - Prüfverfahren zur Bestimmung der Stoßdämpfung

This European Standard was approved by CEN on 29 October 2017.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 1177:2018 E

Contents

Page

European foreword

This document (EN 1177:2018) has been prepared by Technical Committee CEN/TC 136 “Sports, playground and other recreational facilities and equipment”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by July 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1177:2008.

European standards for playground equipment and surfacing comprise this European Standard and the EN 1176 series, which consists of a number of parts as follows:

— *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 cableways*

— *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 on installation, inspection, maintenance and operation*

— *Part 10: Additional specific safety requirements and test methods for fully enclosed play equipment*

— *Part 11: Additional specific safety requirements and test methods for spatial network*

This standard should also be read in conjunction with:

— EN 1176:2017 series

— CEN/TR 16467:2013, *Playground equipment accessible for all children*

— CEN/TR 16598:2014, *Collection of rationales for EN 1176 - Requirements*

— CEN/TR 16396:2012, *Playground equipment for children, replies to requests for interpretation of EN 1176:2008 and its parts*

For inflatable play equipment, see EN 14960, *Inflatable play equipment — Safety requirements and test methods*.

The principal changes from the previous edition of this European Standard are as follows:

a) European foreword: References to CEN/TRs added.

b) Introduction: Rationale for retaining HIC 1 000 and introducing g_{max} 200 as upper limits for surfacing when assessed in accordance with this standard has been added.

c) Scope: Two methods of impact testing are now provided. Method 1 (as in the previous edition) – Test for determination of Critical Fall Height AND new Method 2 – Test for measurement of impact attenuation on site to enable, upon installation or at periods later in its life, confirmation as required of suitability of the product for that specific site location at the time of the test.

d) Body of standard:

   1) change of the order and adding new clauses by implementation of Method 2;

   2) adaption of recent technology for requirements on test apparatus and measurements in order to improve accuracy of results (including checks by operators);

   3) adapting Annex B and adding new Annexes C, D, E and F.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is based on the safety principles given in EN 1176-1 for playground equipment and provides a method for the assessment of impact attenuation of surfaces intended for use in the impact area as defined in EN 1176-1. This standard (EN 1177) aims to reduce consequences of experiencing risks that are desirable for child development according to the principles set in EN 1176-1.

Injuries arise during the use of playground equipment for a variety of reasons and the great majority are minor. Even the presence of protection features like impact attenuating surfacing is known to affect the behaviour of children, as well as carers and play providers, which in turn can affect the risk. The majority of more serious injuries are attributable to falls and there are many factors that influence injury mechanisms during a fall that are independent of the surfacing, e.g. body orientation, awkwardness of fall, bone density, etc.

The most severe injuries are likely to be injuries to the head. Recent research has indicated that arm and leg injuries are more frequent and could be influenced by the duration of the acceleration pulse. The committee responsible for this European Standard maintains a constant review of research in this area for possible use in a future revision of this standard. The committee recognizes that there is a relationship between the risk of arm and leg injuries and surface type but takes the view that such injuries are not usually in the most severe category. At present the available injury data can be taken into account by limitation of the maximum (peak) acceleration.

Consequently, the committee has chosen to make its priority the reduction of the likelihood of serious head injuries caused by a fall from playground equipment, because even though such injuries are relatively uncommon, they can have the most severe consequences. The severity of injury resulting from an impact to the head can be quantified in terms of Head Injury Criterion (HIC) and the level of HIC = 1 000 together with the upper limit of the peak acceleration of g_{max} = 200g (g for gravity) have been chosen as the upper limits for surfacing when assessed in accordance with this standard.

Limiting the HIC value at a maximum of 1 000 is equivalent to a 3 % chance of a critical head injury (MAIS[1] 5), an 18 % probability of a severe (MAIS 4) head injury, a 55 % probability of a serious (MAIS 3) head injury, a 89 % probability of a moderate head injury (MAIS 2), and a 99,5 % chance of a minor head injury (MAIS 1), to an average male adult.

Limiting g_{max} to a maximum of 200g as well as limiting HIC to a maximum of 1 000 takes account of impacts of very short duration and follows the current research on arm injuries as a means of improvement to the Standard.

Two methods of impact tests are provided. The first method is for determination of the Critical Fall Height to enable full and detailed confirmation of a product's range of suitability. The second method describes an on-site drop test, without determination of critical fall height to enable, upon installation or at periods later in its life, confirmation as required of the performance of the surfacing in that specific site location at the time of the test.

The EN committee is aware of discussions within ASTM International since 2014 about a reduction in the HIC threshold to 700 in its corresponding standard. The current limiting value of HIC ≤ 1 000 has been used in Europe since 1998 and the EN committee considers that at present, there is insufficient evidence of net overall value to playground users to support a change. It has therefore chosen to retain the value HIC ≤ 1 000 and to provide a second threshold of 200g as the criteria of acceptability in this standard, whilst continuing to monitor research publications on this subject. The same has been decided by ASTM for the time being.

---

1 Maximum Abbreviated Injury Scale, first developed by the Association for the Advancement of Automotive Medicine and used extensively in the automotive industry as an indicator of the severity of head-related injuries.

A variety of materials, both natural and synthetic, may be used as impact attenuating surfacing with different attributes and performance. These include grass growing in soil, sand, wood chips, bark, gravel, and various rubber-based products which may be in the form of tiles or continuous coatings or combinations of these materials. Whilst the methods described in this Standard can be used to assess the impact attenuation performance of any of these surfaces, attention of users is drawn that the behaviour of some materials can be highly variable and dependent on prevailing test conditions and that test results will likely vary over time or with climatic conditions.