SLOVENSKI STANDARD
SIST EN 1177:1998

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Ublaģitev udarcev pri povrġinah otroġkih igriġļ - Varnostne zahteve in preskusne metode

Impact absorbing playground surfacing - Safety requirements and test methods

Stoßdämpfende Spielplatzböden - Sicherheitstechnische Anforderungen und Prüfverfahren

Revetements de surfaces d'aires de jeux absorbant l'impact - Exigences de sécurité et méthodes d'essai

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English version

Impact absorbing playground surfacing - Safety requirements and test methods

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 136 "Sports, playground and other recreational equipment", the secretariat of which is held by DIN.

BT has decided to package EN 1176-1, EN 1176-7 and EN 1177. In accordance with the CEN/CENELEC Internal Regulations, the latest date by which national standards conflicting with this European Standard have to be withdrawn is 1998-12-31.

In the field of playground equipment the following drafts exist, which should be read in conjunction with this standard.

prEN 1176-1 Playground equipment -
Part 1 : General safety requirements and test methods.

prEN 1176-2 Playground equipment -
Part 2 : Additional specific safety requirements and test methods for swings.

prEN 1176-3 Playground equipment -
Part 3 : Additional specific safety requirements and tests methods for slides.

prEN 1176-4 Playground equipment -
Part 4 : Additional specific safety requirements and tests methods for runways.

prEN 1176-5 Playground equipment -
Part 5 : Additional specific safety requirements and tests methods for carousels.

prEN 1176-6 Playground equipment -
Part 6 : Additional specific safety requirements and tests methods for rocking equipment.

EN 1176-7 Playground equipment -
Part 7 : Guidance on installation, inspection, maintenance and operation.

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 March 1998, and conflicting national standards shall be withdrawn at the latest by December 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Injuries in playgrounds occur from a variety of reasons but it is considered that the most severe injuries are likely to be injuries to the head. Consequently priority has been given to developing a criterion for surfacing materials intended to assess their ability to reduce the likelihood of head injuries.

On the basis of statistical analysis of available data the Head Injury Criterion (HIC) at a tolerance level of 1000 has been used as the upper limit for the injury severity unlikely to have fatal consequences. Using HIC considers only the kinetic energy of the head when it impacts the playground surfacing. This is considered to be the best model available to predict the likelihood of injuries from falls.

There is a variety of materials available providing impact attenuation, including rubber tiles, mats, slabs, continuous synthetic surfacing, either prefabricated or formed 'in-situ', loose particulate material, such as gravel, sand, wood chips, bark, etc. The test method in this standard can be used to assess any of these surfaces.

1 Scope

This standard specifies requirements for surfacing to be used in children's playgrounds and specific requirements for areas where impact attenuation is necessary. It suggests the factors to be considered when selecting playground surfacing and gives a method of test by which the impact attenuation can be determined; this test gives a critical fall height (see 3.5) for surfacing, that represents the upper limit of its effectiveness in reducing head injury when using playground equipment conforming to EN 1176.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 1176-1: 1996
Playground equipment -
Part 1 : General safety requirements and test methods

ISO 1302
Technical drawings - Method of indicating surface texture

ISO 6487
Road vehicles - Measurement techniques in impact tests - Instrumentation

3 Definitions

For the purposes of this standard, the definitions given in prEN 1176-1 apply together with the following :

3.1 surfacing: Area of a playground from which the use of the equipment commences and which comprises at least the impact area (see 3.4).

3.2 impact attenuation: Property of a surface, which dissipates the kinetic energy of an impact by localized deformation or displacement such that the acceleration is reduced.

3.3 free height of fall: Greatest vertical distance from the clearly intended body support to the impact area below. [prEN 1176-1]

NOTE: The intended body support includes those standing surfaces to which access is provided.

3.4 impact area: Area that can be hit by a user after falling through the falling space. [prEN 1176-1]

3.5 critical fall height: Lowest test result obtained in accordance with 6.4.3.

NOTE: The critical fall height represents the upper limit of all free heights of fall, for which the surfacing provides an acceptable level of impact attenuation.

3.6 head injury criterion (HIC) value: Criterion for head injuries caused from falls as calculated in accordance with the formula given in 6.5.1.

3.7 test position: Position on the material to be tested located vertically below the centre of the headform.

3.8 drop height: Distance between the test position on the surfacing and the lowest point of the free falling headform prior to release.

NOTE: In the case of a guided headform this value is calculated from measurement of velocity (see 6.2.4).

3.9 impact measurement: HIC value from the recorded acceleration of the headform falling

velocity (see 6.2.4).

3.9 impact measurement: HIC value from the recorded acceleration of the headform falling from one fall height onto one test position of the test specimen.

3.10 drop test: Series of impact measurements carried out from at least four increasing fall heights.

3.11 loose particulate material: Material which absorbs the energy of an impact usually through its displacement.

4 Safety requirements

4.1 General

4.1.1 The surfacing shall be free from any sharp edged parts or any hazardous projections.

4.1.2 The surfacing shall be installed without creating any point of entrapment (see prEN 1176 -1).

4.1.3 If loose particulate material is used it shall be installed to a layer thickness of 200 mm more than that found by laboratory testing to be necessary to achieve the required critical fall test.

NOTE: This is to allow for displacement through use.

4.2 Impact attenuation

4.2.1 Materials with no significant impact attenuating properties shall only be used outside the impact area.

NOTE: Such materials include bricks, stones, concrete, bituminous material, macadam and timber.

4.2.2 Beneath all playground equipment with a free height of fall of more than 600 mm, there shall be impact attenuating surfacing over the entire impact area.

The extent of this area is given in E.2 of prEN 1176-1:1996.

Beneath playground equipment having a free height of fall not exceeding 600 mm, the surfacing used should have some impact attenuating properties, but in such situations no test of its critical height is required.

NOTE 1: Materials such as topsoil and turf have some limited impact attenuating properties and experience has shown that, if well maintained, they are effective for fall heights up to 1 m and can be used without the need to conduct a test. If not adequately maintained, their impact attenuation is significantly reduced.

When tested in accordance with the method given in clause 6, the critical height of the surfacing shall be equal to, or greater than, the free height of fall of equipment.

NOTE 2: Examples for commonly used impact attenuating materials and critical fall heights are given in annex A.

5 Information to be provided by the manufacturer or supplier

5.1 The supplier of a playground surfacing shall provide instruction on the following:

a) correct installation;

b) maintenance; and

c) inspection procedures.

5.2 The surfacing shall be labelled by the manufacturer or supplier, or written information shall be provided for its identification and performance.

6 Test method

6.1 Principle

Test specimens or installed areas of the impact absorbing materials under test are struck by an instrumented headform in a defined series of impacts from different drop heights. The signal emitted by an accelerometer (see figure C.1) in the headform during each impact is processed to yield a severity from the measured impact energy, defined as head injury criterion (HIC). The HIC of each impact is plotted and the critical fall height is calculated (see figure C.2).

NOTE: This test can be conducted on the playground site.

6.2 Apparatus

6.2.1 Test rig, comprising headform with accelerometer (see 6.2.2) with charge amplifier, (see 6.2.3) (optional) if using a uniaxial accelerometer a guidance system (see 6.2.4) and impact measuring equipment (see 6.2.5) as shown in figure B.1.