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Podloge za športne dejavnosti - Ugotavljanje stopnje prepojitve z vodo

Surfaces for sports areas - Determination of water infiltration rate

Sportböden - Bestimmung der Wasserinfiltrationsrate

Sols sportifs - Détermination de la vitesse d'infiltration de l'eau

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ICS:

97.220.10	Športni objekti	Sports facilities

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Surfaces for sports areas - Determination of water infiltration rate

Sols sportifs - Détermination de la vitesse d'infiltration de l'eau

Sportböden - Bestimmung der Wasserinfiltrationsrate

This European Standard was approved by CEN on 11 July 2013.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 12616:2013) has been prepared by Technical Committee CEN/TC 217 “Surfaces for sports areas”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

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This document supersedes EN 12616:2003.

Compared with EN 12616:2003, the text has been clarified and editorial errors have been corrected.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies three methods for the determination of water infiltration rate. Method A is suitable for synthetic, textile, synthetic turf and bound mineral sports surfaces, Method B is suitable for natural turf and Method C is suitable for unbound mineral sports surfaces.

NOTE For filled synthetic turf and unbound mineral surfaces, laboratory tests are considered to give a more precise indication of how a surface will perform.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12229, *Surfaces for sports areas — Procedure for the preparation of synthetic turf and needle-punch test pieces*

3 Principle

Water is ponded within two concentric cylinders that have been sealed onto or hammered into the sports surface. The outer cylinder is used as a buffer area to prevent the lateral flow of water from the inner cylinder.

NOTE A single cylinder can be used if the test piece is fully sealed to prevent lateral flow of water.

The rate of entry into the sports surface from the inner cylinder is measured.

4 Apparatus

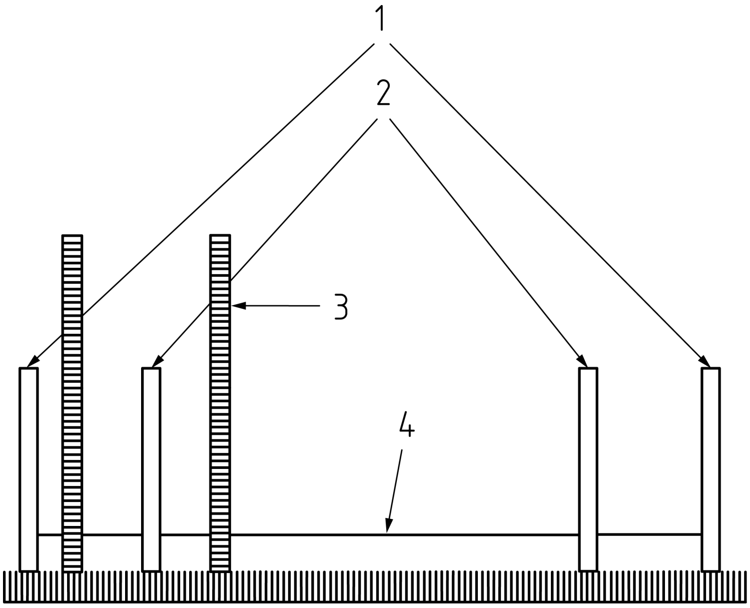
4.1 Infiltrometer, with dimensions specified in 4.1.1, 4.1.2 and 4.1.3, consisting of one or two metal cylinders (see Figure 1) capable of being sealed onto, or hammered perpendicularly into, the sports surface, as appropriate to minimise lateral leakage.

4.1.1 Large cylinder, double-ring infiltrometer, for tests on synthetic turf and synthetic surfaces and mineral and natural turf surfaces with a rate of water infiltration less than 500 mm/h, consisting of an inner cylinder of inner diameter (300 ± 5) mm forming the measurement area and an outer cylinder of inner diameter (500 ± 25) mm forming the buffer area to prevent the lateral flow of water from the inner cylinder.

A wide tolerance on the cylinder diameter is permitted to allow the cylinders to be stacked for ease of transport.

4.1.2 Small cylinder, double-ring infiltrometer, for tests on mineral surfaces with a rate of water infiltration greater than 500 mm/h and where the available water supply is limited, consisting of an inner cylinder of inner diameter (150 ± 5) mm and an outer cylinder of diameter (300 ± 25) mm.

4.1.3 Single ring infiltrometer, in cases where the test piece can be fully sealed to prevent lateral flow of water, e.g. when measuring the rate of water infiltration in the laboratory, consisting of a single cylinder of dimensions conforming to the inner cylinder dimensions of 4.1.1 or 4.1.2.



Key

1 outer cylinder

2 inner cylinder

3 scale

4 water level

Figure 1 — Double ring infiltrometer

4.2 Graduated scale or other apparatus, enabling the depth of water to be measured to an accuracy of 1 mm.

4.3 Clock, accurate to 1 s.

4.4 Temperature measuring apparatus, capable of measuring the temperature of the water to an accuracy of 1 °C.

4.5 Sealing material, means of sealing the infiltrometer to the surface such as low modulus elastomeric compounds (silicone rubber or a strip of closed-cell, compressible foam).

NOTE On synthetic sports surfaces, self-adhesive, closed-cell foam strip such as is commonly used as a draught excluder has been found suitable. A low-modulus, elastomeric tubing, such as silicone, can also create an effective seal on some surfaces.

The sealant shall be chosen to leave no residue on the test surface.

4.6 Water supply

4.7 Heavy weights, to apply to the top of the apparatus to improve the seal, particularly where the test surface is heavily textured.

5 Method A — Synthetic turf, textile, synthetic and bound mineral sports surfaces

5.1 Test specimen – laboratory tests

A piece of sports surface of minimum length 1 000 mm and minimum width 1 000 mm, in combination with the supporting layers to be used in service, if required, and using the recommended method of attachment in accordance with the manufacturer's instructions.

The test specimen shall be selected so the infiltrometer is positioned with the minimum number of drainage holes (perforated into the sports surface backing) possible within the two rings.

Prepare laboratory tests specimens of either synthetic turf or textile materials in accordance with EN 12229.

5.2 Test conditions

Tests shall be carried out at the prevailing site conditions.

5.3 Number and distribution of test locations on site

Unless specified in the product standard, test locations on site shall be selected be as follows. On sports surfaces of less than 3 000 m^2 in area, at least one test reading shall be performed per 500 m^2. On sports surfaces larger than 3 000 m^2 at least one test reading shall be performed per 1 000 m^2. All test locations shall be selected at random.

5.4 Procedure

5.4.1 If sealing of synthetic turf is required, remove any particulate fill by vacuum to allow the rings to seal onto the primary backing of synthetic turf carpets and assist the prevention of lateral seepage of water. Do not disturb the particulate fill in the measurement area.

Seal the cylinders onto the sports surface with sealing material (4.5) taking care to ensure that the sealing material does not restrict water infiltration from any of the area enclosed by the inner cylinder. Apply the weights (4.7) if necessary.

5.4.2 Pond water in both cylinders until the flow of water into the inner cylinder is constant and the water level approaches a steady-state value. Ensure that the water level in the outer cylinder is within ± 2 mm of the level in the inner cylinder.

5.4.3 Measure the time (t_A) for the water to fall by 20 mm from an initial ponding depth of (30 ± 1) mm to a final ponding depth of (10 ± 1) mm, or the fall in the water level (F_{WA}) after a minimum of 30 min, whichever is quicker.

NOTE The water levels between the cylinders can be maintained by the use of a siphon. Where a siphon has been employed, remove it before making any measurements.

If the test piece is laid on a slope, measure the depth of water at the location in each ring with the greatest depth of water.

5.5 Calculation and expression of results

Calculate the water infiltration rate I_A, expressed in millimetres per hour, from the following formula:

$$I_A = \frac{F_{WA}}{t_A}$$

where

F_{WA} is the fall of water level (mm);

t_A is the time taken for the water level to fall (h).

6 Method B — Natural turf

6.1 Number and distribution of test locations

Take at least six readings at random on sports surfaces of less than 100 m^2, take between seven and 10 readings, as appropriate, at random on sports surfaces of 100 m^2 to 1 000 m^2 and take between 10 and 20 readings, as appropriate, at random on sports surfaces of 1 000 m^2 to 5 000 m^2. Subdivide larger sports surfaces into two or more sections and test each section as above.

6.2 Procedure

6.2.1 Hammer the cylinders of the double ring infiltrometer (4.1) into the surface to a depth of (50 ± 5) mm, taking care to seal any cracking along the soil/cylinder interface by pressing down the soil around the wall of the infiltrometer.

6.2.2 Pond water in both cylinders, as described in 5.4.2.

Ideally, infiltration rates should be measured when soil moisture levels are high, and in this case a 'wetting-up' period of 20 min should be used. If tests are carried out in dry summer weather, at least one hour should elapse between the start of ponding and the start of measurement.

6.2.3 Measure the fall in water level (F_{WB}) in the inner cylinder from an initial ponding depth of 30 mm over a time of 20 min. In cases when drainage is more rapid, record the time for the water to fall 25 mm. In all cases, maintain the water level in the outer cylinder to within ± 2 mm of the level in the inner cylinder.

6.3 Calculation and expression of results

Calculate the water infiltration rate I_B, expressed in millimetres per hour, from the following formula:

$$I_B = \frac{F_{WB}}{t_B}$$

where

F_{WB} is the fall of water level (mm);

t_B is the time taken for the water level to fall (h).

7 Method C — Unbound mineral surfaces

7.1 Number and distribution of test locations

Take at least five test readings at random on sports surfaces of less than 6 000 m^2. Subdivide larger sports surfaces into two or more sections and test each section as above.