



**SLOVENSKI STANDARD**  
**oSIST prEN 15673-1:2007**  
**01-junij-2007**

---

I [ cHj `Ub^cXdcfbcgh]`Hb] `dcj fy]b`dfcH]`nXfgi `!`A YrcXUcWb^Yj Ub^U!`%`XY.  
FYZfYb bUa YrcXU

Determination of slip resistance of pedestrian surfaces - Method of evaluation - Part 1:  
Reference method

Bestimmung der Rutschhemmung von Fußböden - Ermittlungsverfahren - Teil 1:  
Referenzmethode

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

**Ta slovenski standard je istoveten z: prEN 15673-1**  
oSIST prEN 15673-1:2007  
<https://standards.iteh.ai/catalog/standards/sist/2440d119-ba32-47da-94e4-ccc71b18c4b4/osist-pr-en-15673-1-2007>

---

**ICS:**

93.080.10      Gradnja cest      Road construction

**oSIST prEN 15673-1:2007**      **en;de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[oSIST prEN 15673-1:2007](https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007)

[https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-  
ee71bf8e4b4/osist-pren-15673-1-2007](https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007)

April 2007

ICS 93.080.10

English Version

## Determination of slip resistance of pedestrian surfaces - Method of evaluation - Part 1: Reference method

Bestimmung der Rutschhemmung von Fußböden - Ermittlungsverfahren - Teil 1: Referenzmethode

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 339.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 Management Centre has the same status as the official versions.

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

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

## Contents

Page

Foreword.....	3
1 <b>Scope</b> .....	4
2 <b>Normative references</b> .....	4
3 <b>Terms and definitions</b> .....	5
4 <b>Principle</b> .....	6
5 <b>Test</b> .....	6

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 15673-1:2007](https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007)

<https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007>

## Foreword

This document (prEN 15673-1:2007) has been prepared by Technical Committee CEN/TC 339 “Slip resistance of pedestrian surfaces - Methods of evaluation”, the secretariat of which is held by IPQ.

This document is currently submitted to the CEN Enquiry.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 15673-1:2007](https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007)

<https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007>

## 1 Scope

This document (prEN 15673-1) describes a reference method incorporating three procedures for the determination in the laboratory of the slip resistance of floorings in the three most commonly encountered situations in which pedestrians walk (normal flooring, barefoot, and industrial situations).

It specifies a laboratory reference method based on the subject-based inclined ramp method against which other test methods, which are able to be used in both, laboratory and on site, are compared. The method of validation is set out in prEN 15673-2 (WI 00339003). If the required degree of correlation is given between one of those test methods and the reference method, that method will be put forward as prEN 15673-2 (WI 00339003) a acceptable slip test method.

The reference method is subdivided in three procedures:

- Procedure 1: Floorings where heel slip in wet conditions and the pedestrian is wearing shoes is the normal mode of pedestrian slip.

NOTE 1 This procedure is based on Four S rubber test shoes with water as the contaminant.

- Procedure 2: Floorings where heel slip in wet conditions when the pedestrian is barefoot is the normal mode of pedestrian slip.

NOTE 2 This procedure is based on barefoot testing and water as the contaminant.

- Procedure 3: Floorings where sole slip in contaminated conditions when the pedestrian is wearing profiled rubber soled shoes is the normal mode of pedestrian slip, for example construction, and industrial work areas.

NOTE 3 This procedure is based on profiled rubber test shoes with engine oil as the contaminant.

This Standard does not cover sports surfaces and road surfaces for vehicles (skid resistance).

NOTE 4 Any test method specified for the in situ measurement of slip resistance (prEN 15673-2 (WI 00339003)) should be suitable for use on external pedestrian surfaces and those internal pedestrian surfaces that have a reasonably foreseeable risk of the presence of liquid contaminants, e. g. water, oil, etc. The reading given by the test apparatus relates to the slip resistance potential of the surface tested in the test environment. It does not take into account different shoe sole materials, characteristics of individual gaits, or other factors that may contribute to slips.

NOTE 5 The procedure 3 of the reference method is also suitable for measuring the slip resistance of gratings, profiled surfaces and resilient surfaces that have a reasonably foreseeable risk of the presence of wet substances such as water, grease and oil. It is also suitable for measuring profiled surfaces where the surface has been specifically manufactured to be highly slip resistant because of the physical interlock between the profile of the surface and the profile of the shoe.

## 2 Normative references

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

EN 345-1, *Safety footwear for professional use — Part 1: Specification (includes Amendment A1:1997)*.

EN 345-2, *Safety footwear for professional use — Part 2: Additional specifications*.

EN 360:1993: *Personal protective equipment against falls from a height – Retractable type fall arresters*.

EN 361:1993: *Personal protective equipment against falls from a height – Full body harnesses*.

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method (ISO 5725-2:1994 including Technical Corrigendum 1:2002)*.

ISO 5725-5, *Accuracy (trueness and precision) of measurement methods and results — Part 5: Alternative methods for the determination of the precision of a standard measurement method (ISO 5725-5:1998)*.

SAE J 300:1999, *Engine Oil Viscosity Classification*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply

#### 3.1

##### **acceptance angle**

lowest angle of the inclined ramp at which the test person reaches the limit of safe walking when slipping occurs

#### 3.2

##### **contaminant**

material on the surface of the flooring which is not an inherent part of the flooring and which can affect the frictional properties of that flooring

#### 3.3

##### **flooring**

pedestrian surface excluding road surfaces and sports surfaces

<https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-ee71bf8e4b4/osist-pren-15673-1-2007>

#### 3.4

##### **friction**

intrinsic property of the two interfacing, interacting surfaces resulting from their micro- and macro-roughness, inter- and intra-molecular forces of attraction and repulsion, and their visco-elastic properties

#### 3.5

##### **industrial work area**

area from which the public is generally excluded, and in which there can be an increased risk of slipping on the flooring due to a high incidence of substances such as grease, oil, water, foodstuffs, food residues, dust, flour or vegetable waste

#### 3.6

##### **slip**

loss of traction which can cause the test persons to lose their footing

#### 3.7

##### **slip resistance**

a measure of dynamic friction between two surfaces in contact and which may or may not be in the presence of a specified contaminant

NOTE The frictional force opposing movement of an object across a surface, usually with reference to the sole (including the heel) of a shoe or to the barefoot contact area on a floor.

#### 3.8

##### **test person**

the person who walks on the test surface or verification/calibration board

**3.9**  
**test walk**

one walking period to determine a single acceptance angle

## 4 Principle

Two test persons, wearing the standard test shoes or bare-footed, are used to determine the acceptance angle, after the pedestrian surface material being tested has been continuously coated with potable water or evenly brushed with engine oil. The test persons, each in turn, facing downhill and with an upright posture, move forwards and backwards over the test surface, as they increase their angle of inclination, until the limit of safe walking is reached or a slip occurs. The mean acceptance angle obtained is used to express the degree of slip resistance. Subjective influences on the acceptance angle are limited by means of a calibration procedure.

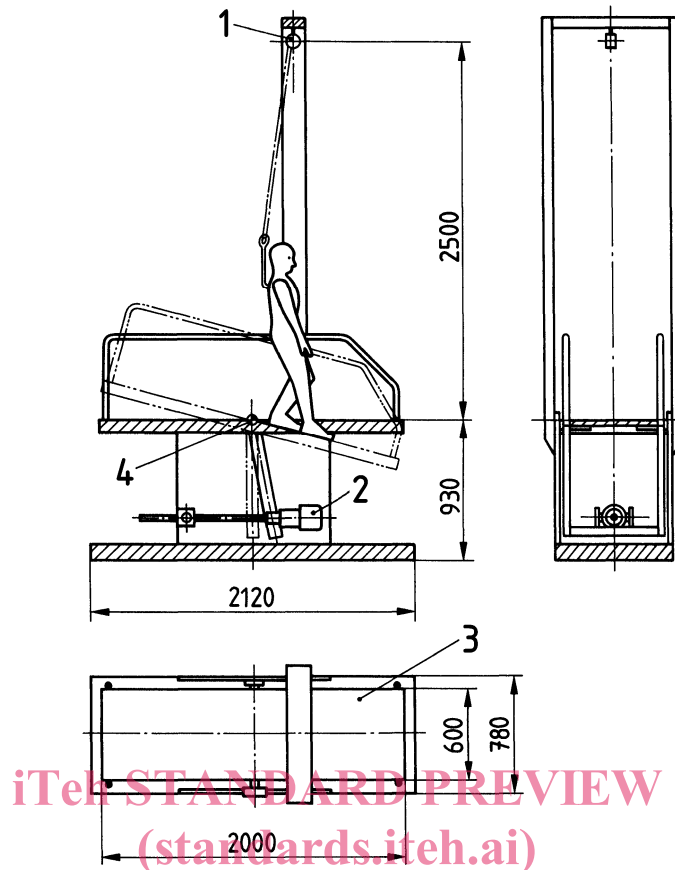
## 5 Test

### 5.1 Apparatus

The apparatus (Figure 1) is a level and torsion-free platform with a minimum sizes of the test surface area (see 5.2) which can be adjusted longitudinally to gradients between 0° to 35°. The lifting speed of the drive unit achieves a platform angular speed of maximum 1° per second, which means that at least 45 s is required to adjust to the maximum angle of at least 35°. The lifting stroke, which can be controlled by the test person, can be selected as a continuous movement and which allows the test person to adjust the inclination in increments of approximately 1°. An angle indicator on the test device shall show the platform tilt away from the horizontal plane at an accuracy of  $\pm 0,2^\circ$ . This indicator shall not be visible to the test person.

The test person shall wear personal protective equipment to be protected from falling by a full body harness and inertia-reel fall arrest system compliant with EN 360 and EN 361 respectively; lanyards shall not be used. The personal protective equipment shall not cause a hindrance to the test persons while walking on the test board so that the gait used by the subjects is not affected.





### Legend

- oSIST prEN 15673-1:2007  
<https://standards.iteh.ai/catalog/standards/sist/24d9d119-ba32-47da-94e4-3e4b4/osist-pren-15673-1-2007>
- 1 Safety harness and fall arrest system
  - 2 Drive unit
  - 3 Inclunable walkway area on which the test surface or verification board is fixed
  - 4 Angle indicator

**Figure 1 — Example of a typical test apparatus (gradient) with safety devices**

## 5.2 Test surface

The test surface area shall be at least 100 cm × 50 cm. The test surface shall be clean and free of production waste, solvents or compaction burrs. The test surface shall be either self-supporting, or as a self-supporting, torsion-free platform with a level surface, or be installed on a level platform of supporting, torsion-free material. The test area shall be clearly identifiable or marked as such.

The test surface shall be installed on the walkway area with the longest edge in the direction of walking. Test surfaces with directional profiles or texture shall be tested in both longitudinal directions.

If the slip resistance differs depending on the direction of walking, then it will be necessary to determine the direction of lowest slip resistance by testing the flooring.

When assessing test surfaces of steps of stairs or ladders, a collection of smaller sections of test material should be installed onto the inclinable walk way in order to meet the required test surface dimensions.

## 5.3 Contaminant

### 5.3.1 Potable water (Procedure 1 or 2)

Potable water shall be used as the contaminant. Prior to testing the potable water should be applied at  $(6,0 \pm 1,0)$  l/min using appropriate jets so as to form a largely uniform spray of contaminant across the test specimen.

### 5.3.2 Aqueous solution (Procedure 1 or 2)

An aqueous solution of a neutral wetting agent shall be used as the contaminant. Sodium Dodecyl Sulphate (Sodium Lauryl Sulphate Standard Laboratory Grade) should be used at a concentrate of 0,1 %. It is important that the test solution is prepared immediately before the test using tap water and is used within a test period of 1 h. The aqueous solution is pumped at  $(6,0 \pm 1,0)$  l/min to wet the whole surface of the floor. The temperature of the solution shall be between 15 °C and 23 °C.

### 5.3.3 Engine oil (Procedure 3)

Engine oil of SAE viscosity grade 10 W 30 according to SAE J 300 shall be used as the contaminant. 200 ml/m<sup>2</sup> oil shall be evenly brushed onto the test surface prior to test walks of each test person.

NOTE The oil shall be stored in a tightly sealed vessel in order to prevent changes to its viscosity.

## 5.4 Test footwear

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

### 5.4.1 Normal footwear (Procedure 1)

Standard test footwear shall be constructed using flat shoes. The surface of the sole be initially covered with 3 mm thick, non-profiled Four-S rubber sheeting with a Shore-D hardness of  $47 \pm 3$  determined according to EN ISO 868, bonded with suitable waterproof adhesive (tacks or stitching shall not be used). Before first use, the surface of the Four-S rubber soling shall be thoroughly abraded using an orbital sander fitted with P400 grade silicon carbide abrasive paper in order to achieve a consistent, even, reproducible finish over the entire surface. The abrasive paper shall be discarded when noticeable wear or tearing occurs. Freshly abraded solings shall be dusted before testing using a clean, soft brush.

Reabrading shall be undertaken immediately prior to each test surface evaluation. Care should be taken after preparation to prevent the contamination of solings, for instance by walking on the laboratory floor. If contamination occurs, remove the debris and reabrade the sole. As a preconditioning the solings shall have been wetted with the contaminant (5.3.1 or 5.3.2) for at least 10 minutes prior to the test.

### 5.4.2 Bare-footed (Procedure 2)

As a preconditioning the feet of the test persons shall be wetted with the contaminant (5.3.1 or 5.3.2) for at least 10 minutes prior to the test.

### 5.4.3 Industrial footwear (Procedure 3)

The test persons wear protective shoes of type B, shape S1 according to EN 345-1 and EN 345-2 with a shoe sole made of nitril-rubber-base, Shore-A hardness  $72 \pm 2$  determined according to EN ISO 868 with a profile according to Figure 2.

Before first use, the surface of the test shoe soling shall be thoroughly abraded using an orbital sander fitted with P400 grade silicon carbide abrasive paper in order to achieve a consistent, even, reproducible finish over the entire surface. The abrasive paper shall be discarded when noticeable wear or tearing occurs. Freshly abraded solings shall be dusted before testing using a clean, soft brush. As a preconditioning the solings shall have been wetted with the engine oil (5.3.3) for at least 10 min prior to the test.