



# SLOVENSKI STANDARD

## SIST EN 660-1:1999

01-november-1999

---

### Ugotavljanje odpornosti proti obrabi - 1.del: Stuttgartov preskus

Resilient floor coverings - Determination of wear resistance - Part 1: Stuttgart test

Elastische Bodenbeläge - Ermittlung des Verschleißverhaltens - Teil 1: Stuttgarter Prüfung

Revetements de sol résilients - Détermination de la résistance à l'usure - Partie 1: Essai de Stuttgart

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

Ta slovenski standard je istoveten z: **EN 660-1:1999**

SIST EN 660-1:1999  
<https://standards.iteh.ai/catalog/standards/sist/165c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>

---

#### **ICS:**

97.150            Netekstilne talne obloge            Non-textile floor coverings

**SIST EN 660-1:1999**

**en**

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

SIST EN 660-1:1999

<https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 660-1

April 1999

ICS 97.150

English version

## Resilient floor coverings - Determination of wear resistance - Part 1: Stuttgart test

Revêtements de sol résilients - Détermination de la  
résistance à l'usure - Partie 1: Essai de Stuttgart

Elastische Bodenbeläge - Ermittlung des  
Verschleißverhaltens - Teil 1: Stuttgarter Prüfung

This European Standard was approved by CEN on 2 April 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

[SIST EN 660-1:1999](https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999)

<https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2  
EN 660-1:1999

## FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 134 "Resilient and textile floor coverings", the secretariat of which is held by BSI.

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 October 1999, and conflicting national standards shall be withdrawn at the latest by October 1999.

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.

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

SIST EN 660-1:1999

<https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>

## 1 Scope

This European Standard describes the Stuttgart method for determining the wear resistance of the wear layer of polyvinyl chloride floor coverings under laboratory conditions.

The method is applicable to polyvinyl chloride floor coverings with smooth surfaces. It can be used to determine the wear resistance of surfaces against abrasion and particularly for ranking different wear layer types within one type of product. It is not appropriate for comparing the wear resistance of different materials e.g. rubber and polyvinyl chloride.

## 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.

EN 436 Resilient floor coverings - Determination of density

## 3 Principle

A special wear testing apparatus simulates the rotating movements combined with sliding stress which are caused by the shoes of users on floor coverings e.g. close to doors, cupboards, wash-basins etc. The abrasive medium is emery paper. Alternating stress cycles are carried out with emery paper and leather and indentation stress with steel tacks is part of each cycle.

## 4 Definition

For the purposes of this European Standard the following definition applies.

### **wear**

loss of material from the surface of a floor covering.

## 5 Apparatus and materials

**5.1 Wear testing apparatus**, with the essential dimensions shown in figure 1, consisting of the following.

**5.1.1 A roller table**, which moves horizontally to and fro (i.e. one double travel movement) along a  $(106 \pm 0,5)$  mm path. The number of double travel movements is  $(40 \pm 1)$  per minute.

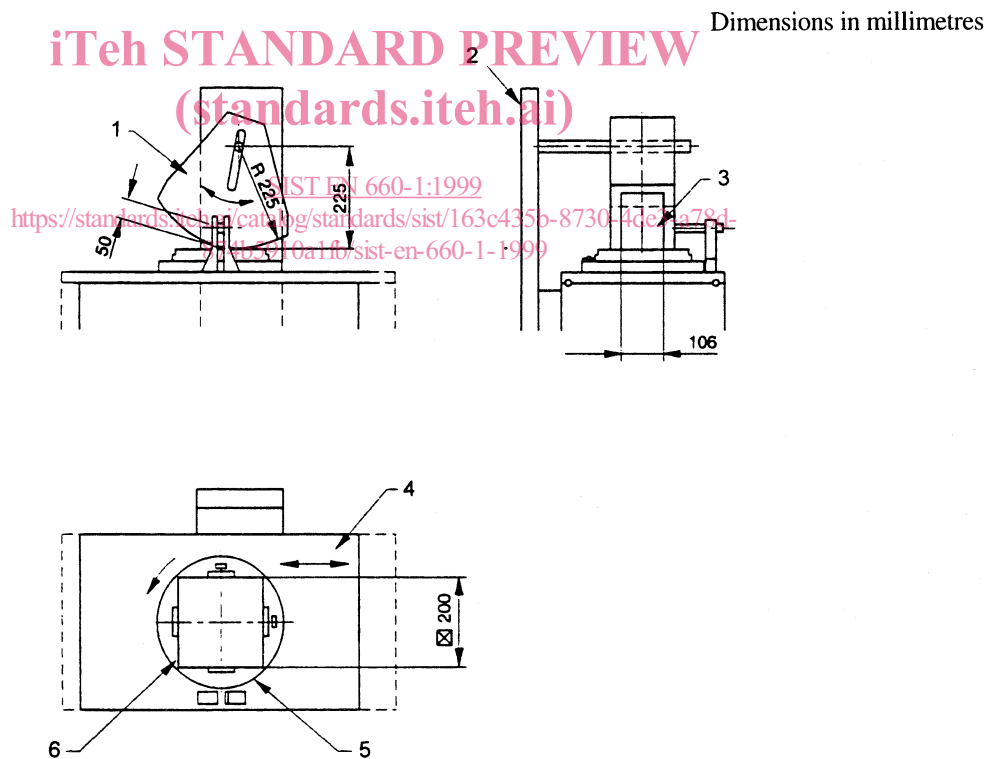
**5.1.2 A rotating clamping plate** for the test piece, revolving at  $(4,0 \pm 0,1)$  revolutions per minute mounted on the roller table.

**5.1.3 A pendulum**, weighing  $(17 \pm 0,1)$  kg with 2 swivel segments with cylindrically arched undersides, radius 225 mm (abrading segment and milling segment). The abrading segment is covered with leather and fitted with devices to stretch emery paper over this surface.

**5.1.4 Two roller bearings**, one fixed to the stand which moves in a track in the pendulum and the other fixed to the pendulum which moves in a track mounted on the table. Both ensure that the movements of roller table and pendulum are linked.

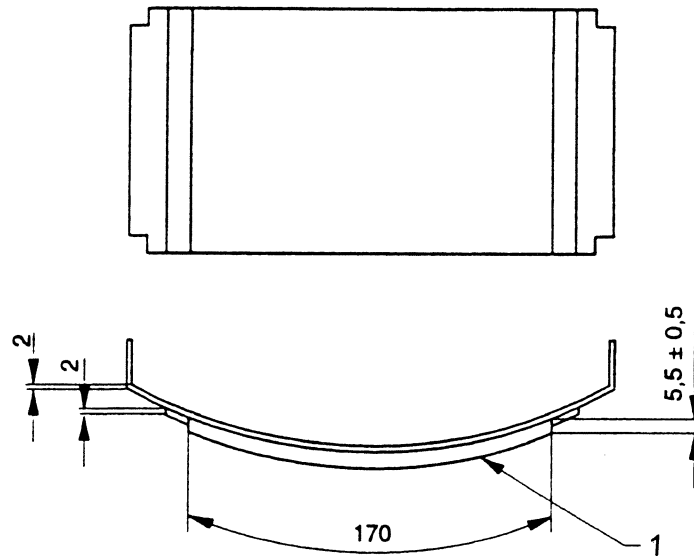
**5.1.5 A suction and blower device**, with apertures which cover the test area.

**5.2 A metal template**, weighing  $(430 \pm 20)$  g, as shown in figure 2, for the milling segment. On the underside at both ends metal strips 2 mm thick and 106 mm long are fixed to form an area of 170 mm by 106 mm in which a leather sole can be glued.



**Figure 1 : Typical wear test apparatus**

Dimensions in millimetres

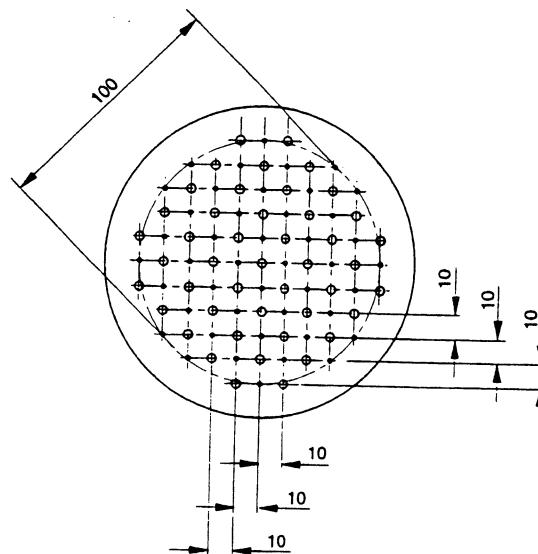


iTeh STANDARD PREVIEW  
(standards.iteh.ai)

1 Leather

Figure 2 : Metal template with glued leather sole

<https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>  
Dimensions in millimetres



- Cylindrical steel tacks 2,5 mm diameter
- Cylindrical steel tacks 1,4 mm diameter

Figure 3 : Plate with steel tacks

**5.3 A device in which emery paper can be fixed**, and which can be installed into the clamping plate instead of the test piece.

**5.4 Emery paper**, with grain size No 50. The description of this specially produced paper is P50 WPE 221. Each delivery of emery paper shall be subjected to a control test in accordance with clause 9.

**5.5 Leather sole**, pit-tanned 170 mm by 106 mm with thickness  $(5,5 \pm 0,5)$  mm, density  $(1,04 \pm 0,08)$  g/cm<sup>3</sup> and Shore-D-Hardness  $(60 \pm 5)$ .

**5.6 Plane-parallel plate**, thickness 10 mm with steel tacks as shown in figure 3. The 89 tacks project 3 mm above the surface of the plate.

**5.7 Square metal support plates**, for the specimen with edge length of  $(200 \pm 0,5)$  mm, e.g. duralumin 4 mm thick.

**5.8 Appropriate adhesive**, to glue the specimen flat upon the support plate or double-sided adhesive tape.

**5.9 Hand brushes**, soft-hair and hard bristle.

**5.10 Balance**, with an accuracy of 0,1 mg.

## 6 Sampling and preparation of specimens

Take a representative sample from the available material.

Take three square specimens, with edge length 200 mm, from the sample. For sheet material take one specimen from the middle of the sample and the second and third approximately 150 mm from the edges.

Check the flatness of the metal support plates (see 5.7) by putting a steel rule diagonally on the plates. Ensure that there is no gap greater than 0,1 mm between the rule and the surface of the plate.

Glue the specimens to the metal plates (see 5.8). Ensure that the whole area of the support plate is covered by the adhesive or the tape.

## 7 Conditioning

Condition the three specimens to equilibrium at a temperature of  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity (standard climate). Equilibrium is reached when the difference between two measured masses in an interval of 48 h is no more than 0,002 g. Maintain these conditions when carrying out the test.

## 8 Preparation of the leather sole

Glue a leather sole (see 5.5) to the metal template (see 5.2) and fix this template to the milling segment of the pendulum (see 5.1.3).



Fix the device with emery paper (see 5.3) on the plate (see 5.1.2). Lower the pendulum with the milling segment to the surface of the emery paper in the device and carry out sufficient double travel movements without the clamping plate rotating, such that the whole surface of the leather sole is roughened.

The leather sole shall be replaced when it is worn down to 2 mm.

## 9 Control test for the emery paper

Test for control purposes approximately 1% of each delivery of the pieces of emery paper. Condition the pieces to equilibrium in the standard climate (see clause 7). Report the last mass reading.

Fix the device with emery paper (see 5.3) on the clamping plate (see 5.1.2). Fix another piece to the abrading segment of the pendulum and lower the pendulum to the surface of the piece of emery paper in the device (grain side to grain side). Carry out ten linear double travel movements, without the clamping plate rotating and without ventilation and suction.

After removing both pieces from the apparatus remove the loosened grains from the pieces. To achieve this allow the pieces of paper to fall on one length edge from a height of approximately 100 mm. The total mass loss of the two pieces shall be  $(0,7 \pm 0,1)$  g.

SIST EN 660-1:1999

**10 Procedure** <https://standards.iteh.ai/catalog/standards/sist/163c435b-8730-4de3-a78d-874b5910a1fb/sist-en-660-1-1999>

### 10.1 Determination of density

For heterogeneous floor coverings separate the wear layer from the sample by abrading the underside until only the wear layer is left. Determine the density of the wear layer according to EN 436 method A or B.

For homogeneous floor coverings, if the sample is smooth on top and on the underside, the density may be determined using a rectangular specimen. Weigh the specimen to an accuracy of  $\pm 0,1$  mg and measure the length and width to  $\pm 0,1$  mm and the thickness to  $\pm 0,01$  mm accuracy. Otherwise follow EN 436 method A or B.

NOTE: If the density cannot be determined, the loss of volume cannot be reported.

### 10.2 Abrasion test

**10.2.1** Weigh the specimens to an accuracy of  $\pm 0,1$  mg after conditioning to determine the initial mass  $m_1$ .

**10.2.2** Carry out the wear tests in cycles, each consisting of the following stages.

**10.2.2.1** *Indentation stress of the specimen surface with the steel-tack plate prior to the first cycle (see 5.6).* Centre the plate on the specimen and exert a force of  $(4000 \pm 100)$  N for 60 s.