



SLOVENSKI STANDARD
SIST EN 14224:2006

01-maj-2006

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Flexible sheets for waterproofing - Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles - Determination of crack bridging ability

Abdichtungsbahnen - Abdichtungen für Betonbrücken und andere Verkehrsflächen auf Beton - Bestimmung der Fähigkeit zur Rissüberbrückung

Feuilles souples d'étanchéité - Systèmes d'étanchéité pour ponts et autres surfaces en béton circulables par les véhicules - Détermination de l'aptitude à ponter les fissures

Ta slovenski standard je istoveten z: EN 14224:2005

ICS:

91.100.50 Veziva. Tesnilni materiali Binders. Sealing materials

SIST EN 14224:2006

en

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EUROPEAN STANDARD

EN 14224

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2005

ICS 91.100.50

English Version

Flexible sheets for waterproofing - Waterproofing of concrete
bridge decks and other concrete surfaces trafficable by vehicles
- Determination of crack bridging ability

Feuilles souples d'étanchéité - Systèmes d'étanchéité pour
ponts et autres surfaces en béton circulables par les
véhicules - Détermination de l'aptitude à ponter les fissures

Abdichtungsbahnen - Abdichtungen für Betonbrücken und
andere Verkehrsflächen auf Beton - Bestimmung der
Fähigkeit zur Rissüberbrückung

This European Standard was approved by CEN on 26 October 2005.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 14224:2005) has been prepared by Technical Committee CEN /TC 254, "Flexible sheets for waterproofing", 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 June 2006, and conflicting national standards shall be withdrawn at the latest by June 2006.

This European Standard is one of a series of standards applicable to flexible sheets for waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles.

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

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EN 14224:2005 (E)**1 Scope**

This European Standard describes a test method for determining the crack bridging ability of reinforced bitumen sheets used in waterproofing systems on concrete bridge decks and other areas of concrete trafficable by vehicles.

2 Normative references

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

EN 12311-1, *Flexible sheets for waterproofing - Part 1: Bitumen sheets for roof waterproofing- Determination of tensile properties*

EN 13416, *Flexible sheets for waterproofing – Bitumen, plastic and rubber sheets for roof waterproofing – Rules for sampling*

EN 13375, *Flexible sheets for waterproofing – Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles – Specimen preparation*

prEN 14695, *Flexible sheets for waterproofing - Reinforced bitumen sheets for waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles - Definitions and characteristics*

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3 Terms and definitions

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For the purposes of this European standard, the terms and definitions given in EN 13416, EN 13375, prEN 14695 and the following apply.

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3.1**crack bridging ability**

ability of reinforced bitumen sheets to withstand movements of the crack without deterioration

3.2**crack width**

distance between the sides of the crack, measured by monitoring the movement of the base specimen during the test

3.3**nominal curve**

input of changes as a function of time which the crack width shall follow during a test

4 Test methods

4.1 Principle

After applying the reinforced bitumen sheet(s), a crack is induced in the base specimen at the saw-cut.

The crack bridging ability of reinforced bitumen sheets is determined by periodically varying the crack width within defined limits. The test can be carried out at different temperatures.

4.2 Apparatus

- a) *Temperature controlled chamber*, with an accuracy of ± 1 °C, for the test specimens and the loading parts of the testing apparatus during the test.
- b) *Testing apparatus*, for generating changes in the crack width, able to register the force induced into the test specimen and to control and monitor the crack width during the test.
- c) *Crack width measuring device*, with an accuracy of $\pm 0,01$ mm, to control and monitor the crack width during the test.

4.3 Sampling and preparation of test specimens

4.3.1 Sampling

Samples and test pieces of the reinforced bitumen sheet(s) shall be taken in accordance with EN 13416.

4.3.2 Preparation of test specimens

Test specimens of type 1 according to EN 13375 with the dimensions of (400 ± 1) mm x (200 ± 1) mm x ≥ 40 mm shall be used. Test specimen preparation is specified as well as specifications for concrete base specimen in EN 13375.

If the reinforced bitumen sheets have anisotropic properties, the test specimens shall be prepared in such a manner that the direction with lower elongation is tested.

NOTE The anisotropic behaviour of reinforced bitumen sheets can be observed by the behaviour during the tensile test according to EN 12311-1 if the elongation is different between the two principle directions of the sheet.

4.4 Procedure

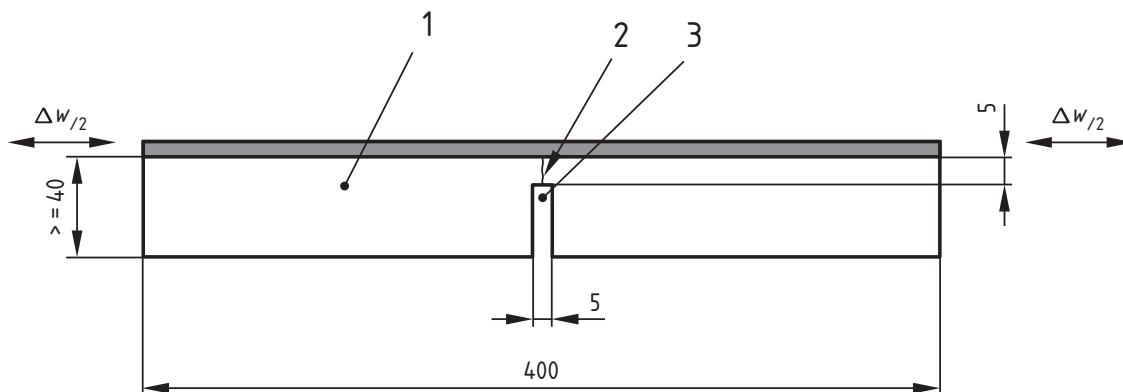
4.4.1 Number of tests

Three tests shall be carried out for each temperature which is intended to be applied.

4.4.2 Preparation for the test

A saw-cut shall be made without damage to the reinforced bitumen sheet(s) in the underside of the base specimens as shown in figure 1. The crack above the saw-cut is produced mechanically in the testing apparatus, see 4.2 b, at test temperature by introducing a controlled force in such a way that no bending in the test specimen occurs. The crack width shall not exceed 0,20 mm during this procedure.

Dimensions in millimetres

**Key**

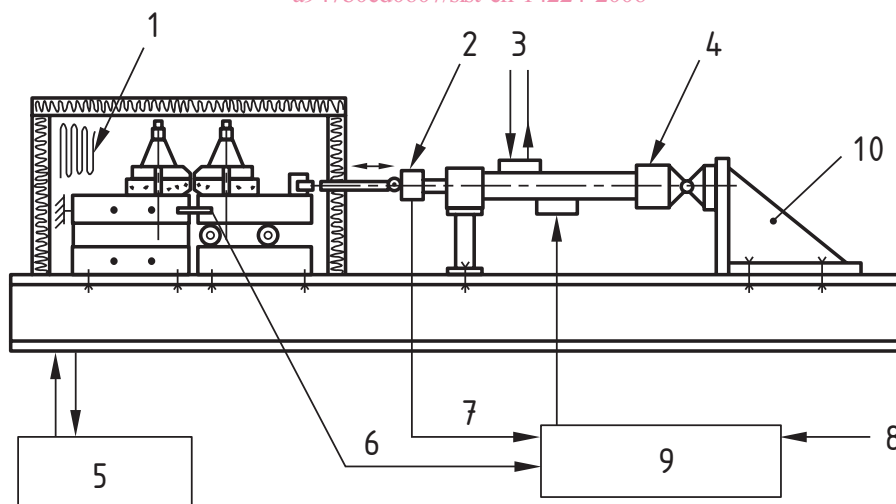
- 1 Test specimen type 1
- 2 Induced crack
- 3 Saw-cut
- $\Delta w/2$ Half amplitude (see 4.4.4)

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Figure 1 — Test specimen

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The test specimen shall be fixed in the testing apparatus in such a way that the relative movement of the test specimen and the apparatus is negligible. The method of attachment in the apparatus shall ensure that the applied force acts in the plane of the tested reinforced bitumen sheets. Bending shall be prevented during testing. An example for a loading device is given in Figure 2.

**Key**

- | | | |
|--------------------------|----------------------|-----------------------|
| 1 Cooling pipes | 5 Cooling compressor | 9 Control electronics |
| 2 Load cell | 6 Position sensor | 10 Support |
| 3 Pump | 7 Load transducer | |
| 4 MTS-hydraulic cylinder | 8 Programme | |

Figure 2 — Example of loading device

The test equipment shall ensure that the movement of the crack lies within the given limits (change in the crack width) and that fretting and shearing of the crack sides are avoided during the test.

Suitable devices for measuring the crack width, accurate to ± 0.01 mm, shall be mounted on the test specimen on both sides of the crack. These measuring devices shall control the change of the crack width.

4.4.3 Test temperature

The test temperature is chosen according to prEN 14695 at one of the following temperatures:

(-30, -20, -10 or 0) °C with an accuracy of ± 1 °C

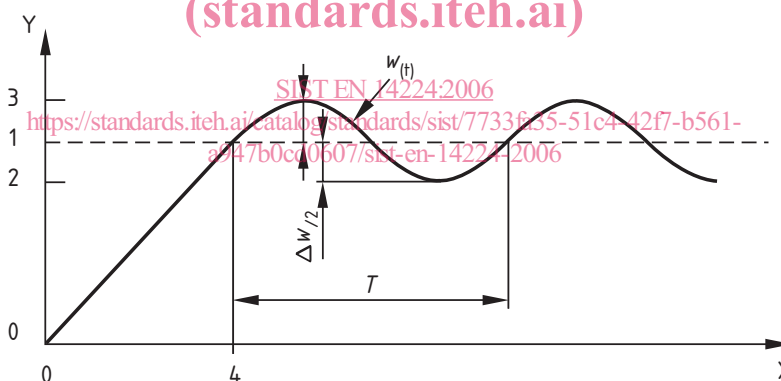
Before testing, the test specimens shall be conditioned at the test temperature for at least 4 h and not longer than 24 h.

4.4.4 Running of the test

The crack shall be opened to a total width of 0.50 mm including the initial crack width after cracking of the test specimen within 60 seconds. The cyclic change of the crack width shall commence without time interruption following the nominal curve, which is calculated using the equation 1.

$$w(t) = w_m \pm \frac{\Delta w}{2} \cdot \sin\left(\frac{2 \cdot \pi}{T} \cdot t\right) \quad (1)$$

Figure 3 demonstrates the crack width $w(t)$ depending on the time t .



Key

Δw	Amplitude	3	Maximum crack width w_{\max}
T	duration of one cycle	4	Commencement of crack cycling
1	Mean crack width w_m	X	Time t
2	Minimum crack width w_{\min}	Y	Crack width $w(t)$

Figure 3 — Nominal curve

The test shall be carried out with the frequency $f = 1$ Hz ($T = 1$ s), the crack amplitude $\Delta w = (0,25 \pm 0,02)$ mm and the mean crack width $w_m = (0,50 \pm 0,02)$ mm.

During the test the force applied to the test specimen to produce the crack width shall be recorded.

The test shall be carried out until 10 000 test cycles have been reached. It shall be stopped if the reinforced bitumen sheet(s) has (have) wholly broken before reaching 10 000 test cycles.

At the end of the test the mean crack width w_m shall be obtained before final observations are made.