



SLOVENSKI STANDARD

SIST EN 13529:2003

01-december-2003

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Products and systems for the protection and repair of concrete structures - Test methods
- Resistance to severe chemical attack

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken -
Prüfverfahren - Widerstand gegen starken chemischen Angriff

Produits et systemes pour la protection et la réparation des structures en béton -
Méthodes d'essai - Résistance aux fortes attaques chimiques

Ta slovenski standard je istoveten z: EN 13529:2003

ICS:

91.080.40 Betonske konstrukcije Concrete structures

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ICS 91.080.40

English version

Products and systems for the protection and repair of concrete structures - Test methods - Resistance to severe chemical attack

Produits et systèmes pour la protection et la réparation des structures en béton - Méthodes d'essai - Résistance aux fortes attaques chimiques

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Prüfverfahren - Widerstand gegen starken chemischen Angriff

This European Standard was approved by CEN on 1 August 2003.

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 Management Centre 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 Management Centre 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This document (EN 13529:2003) has been prepared by Technical Committee CEN/TC 104, "Concrete and related products", the Secretariat of which is held by DIN.

It has been prepared by Sub-committee 8 "Products and systems for the protection and repair of concrete structures" (Secretariat 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 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.

Annex A is informative

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies a method for determining the resistance to severe chemical attack of surface protection systems.

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 (including amendments).

prEN 1504-2, *Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity – Part 2 : Surface protection systems.*

EN 1766, *Products and systems for the protection and repair of concrete structures - Test methods - Reference concretes for testing.*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:1985).*

EN ISO 1513, *Paints and varnishes - Examination and preparation of samples for testing (ISO 1513:1992).*

EN ISO 2808, *Paints and varnishes – Determination of film thickness (ISO 2808:1997).*

EN ISO 2815, *Paints and varnishes – Buchholz indentation test (ISO 2815:2003).*

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EN ISO 15528, *Paints, varnishes and raw materials for paints and varnishes – Sampling (ISO 15528:2000).*

ISO 4628-1, *Paints and varnishes – Evaluation of degradation of paint coatings – Designation of intensity, quantity and size of common types of defect – Part 1 : General principles and rating schemes.*

ISO 4628-2, *Paints and varnishes – Evaluation of degradation of paint coatings – Designation of intensity, quantity and size of common types of defect – Part 2 : Designation of degree of blistering.*

ISO 4628-4, *Paints and varnishes – Evaluation of degradation of paint coatings – Designation of intensity, quantity and size of common types of defect – Part 4 : Designation of degree of cracking*

ISO 4628-5, *Paints and varnishes – Evaluation of degradation of paint coatings – Designation of intensity, quantity and size of common types of defect – Part 5 : Designation of degree of flaking.*

3 Principle

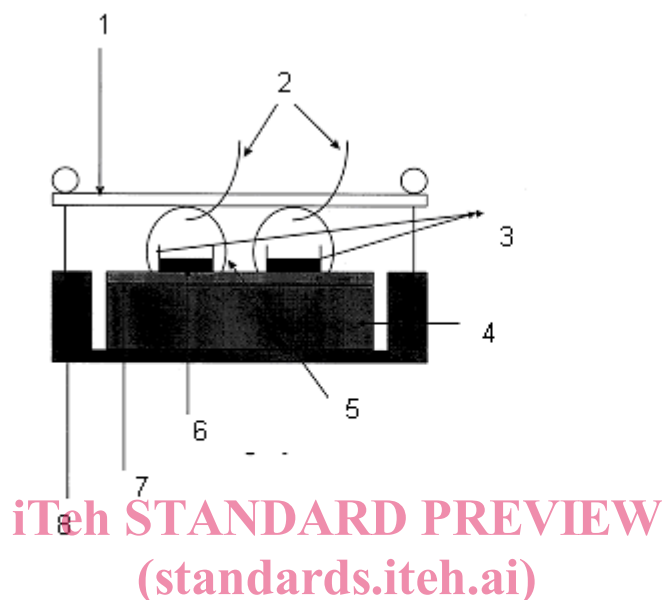
Resistance of the coating system to severe chemical attack is assessed by exposing one side of the surface protection system to the testing liquid.

4 Apparatus

- 4.1 Laboratory maintained at the temperature of (21 ± 2) °C and the relative humidity of (60 ± 10) %.
- 4.2 Usual accessories to apply the surface protection system to the basic test pieces.
- 4.3 Concrete slabs as basic test pieces, according to EN 1766.

4.4 Test apparatus

The test apparatus consists of a metal frame to take up the test piece and to clamp one or two bell-type caisson chambers (see Figure 1) The bell-type caisson chamber consists of a bell-type steel cup with an inner diameter of > 100 mm. (The tested area is a circle with a diameter of 100 mm inside of the glued rings). It is connected to a compressed air vessel equipped with a pressure reducing valve via a compressed air hose. The pressure device is fixed on the surface protection system by a metal clamp. To ensure the tightness of the caisson chamber, a rubber cuff is placed between the surface protection system and the caisson chamber.



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Key

1	Fixing plate	5	Caisson chamber
2	Compressed air hose	6	Testing liquid
3	Glued rings	7	Surface Protection System
4	Concrete slab	8	Metal frame

Figure 1 — Test apparatus

5 Sampling

A representative and homogenous sample of the material under test shall be taken as described in EN ISO 15528. The sample shall be examined and prepared as described in EN ISO 1513.

6 Test method

6.1 Test pieces

Test pieces are concrete slabs measuring at least 300 mm x 200 mm x 40 mm and are fabricated in accordance with EN 1766 using a test concrete (C (0.45) with a maximum aggregate size of 8 mm.

Concrete slabs are prepared and stored according to EN 1766. Surface preparation is carried out according to EN 1766 by grit-blasting. After storage, according to EN 1766, the concrete slabs shall be stored for at least 7 days in a climate of $(21 \pm 2) ^\circ\text{C}$ / $(60 \pm 10) \% \text{ R. H.}$ before they are coated.

The test pieces are coated, cured and stored in accordance with the manufacturer's instructions. The coating thickness is to be measured in accordance with EN ISO 2808.

NOTE

It is possible to use slabs without any reinforcement.

It is also possible to use slabs with a reinforcement cage according to prEN 1062-7:2002, Informative annex C, C.2.2.3. Then, after a crack-bridging test, the test of resistance against severe chemical attack can follow immediately with the same test pieces.

When the resistance of the coating above the crack in the concrete is to be tested, only one bell-type caisson chamber is used. It is positioned exactly above the notch in the slab.

6.2 Procedure

One or two rings made from non porous material resistant to attack by the testing liquid of approximate dimensions height 20 mm, internal diameter 100 mm, are glued on the coating with a chemically resistant sealant or glue in order to contain the testing liquid. Before the testing liquid is poured in, the initial hardness of the coating is measured (see 6.4). When using two rings, two different testing liquids can be used. The level of the testing liquid shall reach a height of 10 mm. The test can be carried out with or without a pressure of 1 bar. When testing with applied pressure the bell-type caisson chamber is fixed and an air pressure of 1 bar (10^5 Pa) is applied. When testing without pressure, it is necessary to cover the glued ring with a lid to avoid evaporation of the testing liquid.

The test duration depends on the field of application, specified in prEN 1504-2. The duration shall be typically 1, 3, 7, 28 or 90 days.

The standard test temperature shall be (21 ± 2) °C, other test temperatures can be agreed between the interested parties.

6.3 Testing liquids

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Testing liquids may be selected from informative annex A or as agreed between the interested parties.

6.4 Evaluation

After being subjected to chemical attack, the testing liquid is removed and the surface is blotted dry using a suitable absorbent or paper cloth and the test pieces are examined in comparison to an unexposed area of the sample for :

- blistering in accordance with ISO 4628-2 ;
- flaking in accordance with ISO 4628-5 ;
- cracking in accordance with ISO 4628-4 ;
- optical changes (e. g. colour, gloss) in accordance with ISO 4628-1 ;
- if it is possible, adhesion or hardness (Buchholz indentation test according to EN ISO 2815 or Shore hardness according to EN ISO 868 appropriate to the type of coating) are measured ;
- penetration of the testing liquid through the coating.

The coating thickness is measured in accordance with EN ISO 2808. The examination is carried out 1 hour and 24 hours after removal of the testing liquid.

7 Test Report

The test report shall contain the following information :

- a) reference to this European standard ;
- b) name and address of the test laboratory ;
- c) identification number and date of the test report ;
- d) name and address of the manufacturer or supplier of the product(s) ;
- e) name and identification marks or batch number of the product(s) ;
- f) date of supply of the product ;
- g) date of preparation of the test specimens and any deviation from the prescribed method of preparation ;
- h) conditions of storage of prepared specimens prior to test ;
- i) dry film thickness in micrometers of the coating and method of measurement in accordance with EN ISO 2808 and whether it is a single or multi-coat system ;
- j) full details of the testing liquid to be used for the test ;
- k) description of all evaluation results ;
- l) details of the test equipment used ;
- m) any deviation of the test method specified ;
- n) date of the test.

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