SLOVENSKI STANDARD
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Proizvodi in sistemi za zaġļ ito in popravilo betonskih konstrukcij - Definicije, zahteve, kontrola kakovosti in ovrednotenje skladnosti - 2. del: Sistemi za zaġļ ito povrġine betona

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

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Definitionen, Anforderungen, Qualitätsüberwachung und Beurteilung der Konformität - Teil 2: Oberflächenschutzsysteme für Beton

Produits et systemes pour la protection et la réparation de structures en béton - Définitions, prescriptions, maîtrise de la qualité et évaluation de la conformité - Partie 2: Systemes de protection de surface pour béton

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Foreword

This document (EN 1504-2:2004) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN.

It has been developed by sub-committee 8 “Products and systems for the protection and repair of concrete structures“, 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of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by December 2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive (89/106/EC).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This Part of EN 1504 does not supersede any other European Standard.

This European Standard is one of a series of standards on products and systems for the repair and protection of concrete structures as listed below:

EN 1504-1, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 1: Definitions.*

prEN 1504-3[1)], *Products and systems for the protection and repair of concrete structures — Definitions , requirements, quality control and evaluation of conformity — Part 3: Structural and non-structural repair.*

EN 1504-4, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 4: Structural bonding.*

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EN 1504-5, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 5: Concrete injection.*

prEN 1504-6[1)], *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 6: Anchoring of reinforcing steel bar.*

prEN 1504-7[1)], *Products and systems for the protection and repair of concrete structures — Definitions — Requirements — Quality control and evaluation of conformity — Part 7: Reinforcement corrosion protection.*

EN 1504-8, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 8: Quality control and evaluation of conformity.*

ENV 1504-9[2)], *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 9: General principles for the use of products and systems.*

1) To be published.
2) ENV 1504-9 will have to be modified when adopted as EN according to finalisation of this standard.

EN 1504-10, *Products and systems for the protection and repair of concrete structures — Definitions — Requirements — Quality control and evaluation of conformity — Part 10: Site application of products and systems and quality control of the works.*

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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Introduction

This document gives specifications for products and systems for the repair and protection of concrete structures. The test methods to which the specifications refer are the subject of separate standards.

Surface protection systems are used as “methods” for the following "principles" presented in ENV 1504-9:

for Principle 1 (PI): Protection against Ingress
- 1.1 hydrophobic impregnation (H)
- 1.2 impregnation (I)
- 1.3 coating (C)

for Principle 2 (MC): Moisture Control
- 2.1 hydrophobic impregnation (H)
- 2.2 coating (C)

for Principle 5 (PR) Physical Resistance/Surface Improvement
- 5.1 coating (C)
- 5.2 impregnation (I)

for Principle 6 (RC): Resistance to Chemicals
- 6.1 coating (C)

for Principle 8 (IR): Increasing Resistivity by Limiting moisture content:
- 8.1 hydrophobic impregnation (H):
- 8.2 coating (C)

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1 Scope

This document specifies requirements for the identification, performance (including durability aspects), safety and evaluation of conformity of products and systems to be used for surface protection of concrete, to increase the durability of concrete and reinforced concrete structures, as well as for new concrete and for maintenance and repair work.

The surface protective methods covered by this document are the following:

— hydrophobic impregnation;

— impregnation;

— coating.

Flooring systems in buildings which are not intended to protect or reinstate the integrity of a concrete structure are standardised in EN 13813.

When products and systems complying with this standard are used in flooring applications that involve substantial mechanical loading, they should also satisfy the requirements of EN 13813.

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.

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EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity.*

EN 1015-3, *Methods of test for mortar for masonry — Part 3: Determination of consistence of fresh mortar (by flow table).*

EN 1015-6, *Methods of test for mortar for masonry — Part 6: Determination of bulk density of fresh mortar.*

EN 1015-7, *Methods of test for mortar for masonry — Part 7: Determination of air content of fresh mortar.*

EN 1062-3, *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Part 3: Determination and classification of liquid-water transmission rate (permeability).*

EN 1062-6, *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Part 6: Determination of carbon dioxide permeability.*

EN 1062-7, *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Part 7: Determination of crack bridging properties.*

EN 1062-11:2002, *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Part 11: Methods of conditioning before testing.*

EN 1081, *Resilient floor coverings — Determination of the electrical resistance.*

EN 1240, *Adhesives — Determination of hydroxyl value and/or hydroxyl content.*

EN 1242, *Adhesives — Determination of isocyanate content.*

EN 1504-1:1998, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 1: Definitions.*

EN 1504-8:2004, *Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 8: Quality control and evaluation of conformity*

ENV 1504-9:1997, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 9: General principles for the use of products and systems.*

EN 1542, *Products and systems for the protection and repair of concrete structures — Test methods — Measurement of bond strength by pull-off.*

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

EN 1767, *Products and systems for the protection and repair of concrete structures — Test methods — Infrared analysis.*

EN 1770, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of the coefficient of thermal expansion.*

EN 1877-1, *Products and systems for the protection and repair of concrete structures — Test methods — Reactive functions related to epoxy resins — Part 1: Determination of epoxy equivalent.*

EN 1877-2, *Products and systems for the protection and repair of concrete structures — Test methods — Reactive functions related to epoxy resins — Part 2: Determination of amine functions using the total basicity number.*

EN 12190, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of compressive strength of repair mortar.*

EN 12192-1, *Products and systems for the protection and repair of concrete structures —Granulometry analysis — Part 1: Test method for dry components of premixed mortar.*

EN 12617-1, *Products and systems for the protection and repair of concrete structures — Test methods — Part 1: Determination of linear shrinkage for polymers and surface protection systems (SPS).*

EN 13036-4, *Road and airfield surface characteristics — Test methods — Part 4: Method for measurement of slip/skid resistance of a surface — The pendulum test.*

EN 13294, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of stiffening time.*

EN 13395-2, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of workability — Part 2: Test for flow of grout or mortar.*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests.*

EN 13529, *Products and systems for the protection and repair of concrete structures — Test methods — Resistance to severe chemical attack.*

EN 13578, *Products and systems for the protection and repair of concrete structures — Test method — Compatibility on wet concrete.*

EN 13579, *Products and systems for the protection and repair of concrete structures — Test methods — Drying test for hydrophobic impregnation.*

EN 13580, *Products and systems for the protection and repair of concrete structures — Test methods — Water absorption and resistance to alkali for hydrophobic impregnation.*

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EN 13581, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of loss of mass of hydrophobic impregnated concrete after freeze-thaw salt stress.*

EN 13687-1, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of thermal compatibility — Part 1: Freeze-thaw cycling with de-icing salt immersion.*

EN 13687-2, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of thermal compatibility — Part 2: Thunder-shower cycling (thermal shock).*

EN 13687-3, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of thermal compatibility — Part 3: Thermal cycling without de-icing salt impact.*

EN 13687-5, *Products and systems for the protection and repair of concrete structures — Test methods — Determination of thermal compatibility — Part 5: Resistance to temperature shock.*

prEN 14630, *Products and systems for the protection an repair of concrete structures — Test methods — Determination of carbonation depth in hardened concrete by the phenolphthalein method.*

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

EN ISO 1517, *Paints and varnishes — Surface-drying test — Ballotini method (ISO 1517:1973).*

EN ISO 2409, *Paints and varnishes — Cross-cut test (ISO 2409:1992).*

EN ISO 2431, *Paints and varnishes — Determination of flow time by use of flow cups (ISO 2431:1993, including Technical Corrigendum 1:1994).*

EN ISO 2808:1999, *Paints and varnishes — Determination of film thickness (ISO 2808:1997).*

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EN ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pyknometer method (ISO 2811-1:1997).*

EN ISO 2811-2, *Paints and varnishes — Determination of density — Part 2: Immersed body (plummet) method (ISO 2811-2:1997).*

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EN ISO 2812-1, *Paints and varnishes — Determination of resistance to liquids — Part 1: General methods (ISO 2812-1:1993).*

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

EN ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate (ISO 3219:1993).*

EN ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile-matter content (ISO 3251:2003).*

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1:1997).*

EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2:2003).*

EN ISO 4628-4, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking (ISO 4628-4:2003).*

EN ISO 4628-5, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking (ISO 4628-5:2003).*

EN ISO 5470-1, *Rubber- or plastics-coated fabrics — Determination of abrasion resistance — Part 1: Taber abrader (ISO 5470-1:1999).*

EN ISO 6272-1, *Paints and varnishes - Rapid-deformation (impact resistance) tests - Part 1: Falling-weight test, large-area indenter (ISO 6272-1:2002).*

EN ISO 7783-1, *Paints and varnishes — Determination of water-vapour transmission rate — Part 1: Dish method for free films (ISO 7783-1:1996, including Technical Corrigendum 1:1998).*

EN ISO 7783-2, *Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete — Part 2: Determination and classification of water-vapour transmission rate (permeability) (ISO 7783-2:1999).*

EN ISO 9514, *Paints and varnishes — Determination of the pot-life of liquid systems — Preparation and conditioning of samples and guidelines for testing (ISO 9514:1992).*

EN ISO 11358, *Plastics — Thermogravimetry (TG) of polymers — General principles (ISO 11358:1997).*

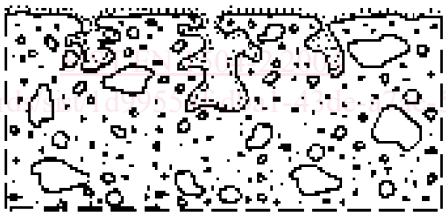
3 Terms and definitions

For the purposes of this document, the following terms and definitions given in EN 1504-1:1998, EN 1504-8:2004, ENV 1504-9:1997 and the following apply.

3.1
hydrophobic impregnation
treatment of concrete to produce a water-repellent surface. The pores and capillaries are internally coated, but they are not filled. There is no film on the surface of the concrete and there is little or no change in its appearance

NOTE Active compounds may be, for example, silanes or siloxanes.

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Figure 1 — Schematic drawing of a typical hydrophobic impregnation

3.2
impregnation
treatment of concrete to reduce the surface porosity and to strengthen the surface. The pores and capillaries are partially or totally filled

NOTE 1 This treatment usually leads to a discontinuous, thin film on the concrete surface.

NOTE 2 Binders may be, for example, organic polymers.



Figure 2 — Schematic drawing of a typical impregnation

3.3
coating
treatment to produce a continuous protective layer on the surface of concrete

NOTE 1 Thickness is typically of 0,1 mm to 5,0 mm. Particular applications may require a thickness greater than 5 mm.

NOTE 2 Binders may be, for example, organic polymers, organic polymers with cement as a filler or hydraulic cement modified with polymer dispersion.

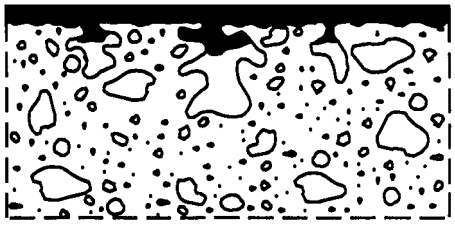


Figure 3 — Schematic drawing of a typical coating

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3.4
layer thickness
dry film thickness defined in EN ISO 2808:1999, Clause 4. It should be determined according to EN ISO 2808.

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— the mean dry film thickness is defined in EN ISO 2808:1999, 4.8;

— the minimum dry film thickness ($d_{\min}$) is to be taken as the lower 5 % fractile of the gaussian distribution of the thickness measurements;

— the absolute minimum dry film thickness that may be achieved on application is at least 0,7 $d_{\min}$

4 Performance characteristics for intended uses

4.1 General

Table 1 lists the performance characteristics of surface protection products and systems which are required for “all intended uses” or “certain intended uses” according to the “principles” and “methods” defined in ENV 1504-9. Performance characteristics which are required for “all intended uses” are marked with ■. All other performance characteristics which are marked with □ may be required for “certain intended uses”.

Performance characteristics and requirements for each method are given in 5.2.

4.2 Selection of appropriate products or systems

The surface protection system shall be selected based on an assessment of the actual or potential causes of deterioration and consideration of the appropriate principles and methods for protection and repair specified in ENV 1504-9. The process leading to the choice of products and systems can be described briefly as follows:

a) Assessment of stresses, defects and damages, their classification and determination of their causes.

b) On the basis of the assessment the “principle(s)” for protection and repair of the concrete structure should be chosen.

c) When the “principle(s)” is(are) defined the appropriate “method” (Hydrophobic impregnation, impregnation and coating) to fulfil one or several principle(s) has to be chosen. The corresponding squares ■ represent in every case basic compulsory characteristics (see Table 1).

d) Based on the diagnosis further characteristics for the products and systems to be used may be selected, if they are necessary for certain intended use.

   The “requirements” for the set of characteristics of the products and systems for the intended use are given in 5.2 (see Tables 3, 4 and 5).

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