SLOVENSKI STANDARD
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Proizvodi in sistemi za zaščito in popravilo betonskih konstrukcij - Definicije, zahteve, kontrola kakovosti in ovrednotenje skladnosti - 10. del: Uporaba proizvodov in sistemov na terenu in kontrola kakovosti del

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

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Definitionen, Anforderungen, Qualitätsüberwachung und Beurteilung der Konformität - Teil 10: Anwendung von Produkten und Systemen auf der Baustelle, Qualitätsüberwachung der Ausführung

Produits et systèmes pour la protection et la réparation de structures en béton - Définitions, prescriptions, maîtrise de la qualité et évaluation de la conformité - Partie 10: Application sur site des produits et systèmes et contrôle de la qualité des travaux

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EUROPEAN STANDARD

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EN 1504-10

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English Version

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

Produits et systèmes pour la protection et la réparation des structures en béton - Définitions, exigences, maîtrise de la qualité et évaluation de la conformité - Partie 10 : Application sur site des produits et systèmes et contrôle de la qualité des travaux

Produkte und Systeme für den Schutz und die Instandsetzung von Betonbauteilen - Definitionen, Anforderungen, Qualitätsüberwachung und Beurteilung der Konformität - Teil 10: Anwendung von Produkten und Systemen auf der Baustelle, Qualitätsüberwachung der Ausführung

This European Standard was approved by CEN on 26 July 2017.

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

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European foreword

This document (EN 1504-10:2017) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN and Subcommittee 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 2018, and conflicting national standards shall be withdrawn at the latest by April 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1504-10:2003.

In comparison with EN 1504-10:2003, the following significant changes have been made:

— a clarification of the scope of the standard;

— a deletion of the normative reference "ENV ISO 8502-1, *Preparation of steel substrates before application of paints or related products – Tests for the assessment of surface cleanliness – Part 1: Field test for soluble iron corrosion products* (ISO/TR 8502-1:1991)" in Table 5 "Summary of tests and observations for quality control", test or observation number 19 because it has been withdrawn. A replacement of the method is under development by ISO/DIS 8502-12;

— additions of terms and definitions;

— clarifications of the title, recommendations and requirements in Clause 5;

— clarification of Clause 6 by adding 6.1 and 6.2;

— replaced reference to specific clauses with a reference to Annex A in method 1.4 "Surface bandaging of cracks" in Table 1 (preparation, application and quality control columns);

— addition of method 1.6 "transferring cracks into joint" in Methods to satisfy principle 1 – Protection against ingress in Table 1;

— addition of method 1.7 erecting external panels in Methods to satisfy principle 1 – Protection against ingress in Table 1;

— addition of method 1.8 applying membranes in Methods to satisfy principle 1 – Protection against ingress in Table 1;

— removal of reference to 8.2.1 (application column) in method 2.2 "surface coating" in Methods to satisfy principle 1 – Protection against ingress in Table 1;

— addition of reference to new 7.2.4 "Microcracks" in method 3.1 (preparation column) in Methods to satisfy principle 2 – Moisture control in Table 1;

— addition of reference to new 7.2.4 "Microcracks" in method 3.2 (preparation column) in Methods to satisfy principle 2 – Moisture control in Table 1;

— addition of reference to new 7.2.4 "Microcracks" in method 3.3 (preparation column) in Methods to satisfy principle 2 – Moisture control in Table 1;

— addition of method 3.4 "Replacing elements" in Methods to satisfy principle 2 – Moisture control in Table 1;

— addition of reference to new 7.2.4 "Microcracks" in method 4.3 (preparation column) Methods to satisfy principle 4 – Structural strengthening in Table 1;

— addition of reference to new 7.2.4 "Microcracks" in method 4.4 (preparation column) Methods to satisfy principle 4 – Structural strengthening in Table 1;

— addition of method 4.7 "Prestressing (post tensioning)" Methods to satisfy principle 4 – Structural strengthening in Table 1;

— change of the title of method 6.1 in Methods to satisfy principle 5 – Increasing physical resistance, according to EN 1504-9 and updated references for preparation and application;

— change of the title of method 7.1 in "Methods to satisfy principle 7 – Preserving or restoring passivity", according to EN 1504-9, and updated references for preparation and application, including reference to the new 7.2.4 "Microcracks";

— addition of reference to the new 7.2.4 “Microcracks” in method 7.2 in "Methods to satisfy principle 7 – Preserving or restoring passivity" (preparation column) in Table 1;

— addition of method 7.5 Electrochemical chloride extraction in "Methods to satisfy principle 7 – Preserving or restoring passivity" in Table 1;

— change of the title of method 8.2 according to EN 1504-9;

— addition of method 8.3 "Coating" in "Methods to satisfy principle 8 – increasing resistivity" in Table 1;

— change of the title of the methods 11.1, 11.2 and 11.3 according to EN 1504-9;

— the methods in Table 2 have been updated according to EN 1504-9;

— addition of requirements regarding microcracks during preparation of the concrete in 7.2.4;

— addition of requirement in 7.3.2 f) by addition of reference to EN ISO 8501-1 regarding the standard of cleaning for method 11.2;

— replacement of reference standard regarding bonding in Table 3, from EN 206-1 to EN 1542;

— bonding requirements in 8.2.1 have to comply with EN 1504-2 and EN 1504-3 in addition to EN 1504-4;

— requirements regarding sprayed mortar and concrete in 8.2.3 have to comply with EN 1504-3 in addition to EN 14487-1 and EN 14487-2;

— addition of EN 1504-7 regarding requirements for products and systems for the execution of work in 9.1;

— addition of 9.2 “Execution classes”;

— addition of test or observations no 46 "Microcracks" in 9.3, Table 5 “Summary of tests and observations for quality control”;

— addition of requirements regarding test or observation no 10 for method 4.1 and 4.2 in Table 5 regarding substrate conditions before and/or after preparation;

— observation number 17 in Table 5 has been changed from test to observation;

— addition of a Pull-out test in test or observation no 36 in Table 5 with reference to EN 12504-3;

— addition of test or observation no 15 "Electrical resistivity" in Table 5 before and/or during application;

— addition of Core and resistance test in test number 15 in "Final hardened condition";

— change of requirement in test no 32 in "Final hardened condition" regarding impregnation in Table 5;

— change of requirements in test 34, 35, 36 and 37 in "Final hardened conditions" regarding application of mortar and concrete in Table 5;

— change of requirements in test 40 in “Final hardened conditions” regarding method 4.1 and 4.2 in Table 5;

— deletion of Clause 11 “Health, safety and the environment”, because it states that regulations shall be followed which they shall be anyhow regardless of what is stated in this standard;

— addition of A.5.2 "Execution classes" in Annex A;

— deletion of A.11 "Health, safety and the environment" in Annex A;

— addition of an informative Annex B which describes a test method for cleanliness of concrete surfaces;

— addition of an informative Annex C which describes a test method for surface roughness;

— addition of an informative Annex D which describes a test method for and degree of microcracking of concrete surfaces.

This European Standard specifies requirements for the execution of protection and repair of concrete structures.

This document is one part of the European Standard on “Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity”. The other parts are listed below:

— *Part 1: Definitions*

— *Part 2: Surface protection systems for concrete*

— *Part 3: Structural and non-structural repair*

— *Part 4: Structural bonding*

— *Part 5: Concrete injection*

— *Part 6: Anchoring of reinforcing steel bar*

— *Part 7: Reinforcement corrosion protection*

— *Part 8: Quality control and Assessment and verification of the constancy of performance (AVCP)*

— *Part 9: General principles for the use of products and systems*

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

Introduction

This European Standard is part of the EN 1504 series which define and specify products and systems for the protection and repair of concrete structures. This standard defines and specifies site application of these products and systems and quality control of the works.

The execution of this work is an important and integral part of the complex process of protection and repair, and this standard specifies how it shall be carried out. The specifications in this standard are part of the definition of the intended use for the relevant products and systems. The main normative references for the EN 1504 series are EN 13670, EN 1990, EN 1992-1-1, EN 1992-1-2, EN 1992-2, EN 1992-3 and EN 206.

The specification for products and systems for protection and repair of concrete structures are given in Parts 2 to 7 of this standard. In practical cases, the reader is referred to Part 9 for selecting repair system before using Part 10.

This standard contains an Annex A which provides guidance and background information to the normative text. The contents of the Annex A are numbered in the same way as the normative text to facilitate reference, but prefixed with "A".

This standard contains Annex B, C and D which provides further information on test methods for cleanliness of concrete surfaces, surface roughness and degree of microcracking of concrete surfaces.

1 Scope

This part of EN 1504 gives requirements for:

— substrate condition before and during application of systems and products;

— storage of systems and products;

— structural stability during preparation, protection and repair;

— methods of protection and repair;

— quality control for execution of work;

— maintenance of the structure.

2 Normative references

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

EN 206, *Concrete - Specification, performance, production and conformity*

EN 1008, *Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

EN 1062-3, *Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination of liquid water permeability*

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*

EN 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 for concrete*

EN 1504-3, *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*

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*

EN 1504-6, *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*

EN 1504-7, *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 AVCP - Part 8: Quality control and Assessment and verification of the constancy of performance (AVCP)*

EN 1504-9:2008, *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 1766:2017, *Products and systems for the protection and repair of concrete structures - Test methods - Reference concretes for testing*

EN 1881, *Products and systems for the protection and repair of concrete structures - Test methods - Testing of anchoring products by the pull-out method*

EN 1990, *Eurocode - Basis of structural design*

EN 1992-1-1, *Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings*

EN 1992-1-2, *Eurocode 2: Design of concrete structures - Part 1-2: General rules - Structural fire design*

EN 1992-2, *Eurocode 2 - Design of concrete structures - Concrete bridges - Design and detailing rules*

EN 10080, *Steel for the reinforcement of concrete - Weldable reinforcing steel - General*

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

EN 12350-1, *Testing fresh concrete - Part 1: Sampling*

EN 12350-5, *Testing fresh concrete - Part 5: Flow table test*

EN 12350-7, *Testing fresh concrete - Part 7: Air content - Pressure methods*

EN 12390-1, *Testing hardened concrete - Part 1: Shape, dimensions and other requirements for specimens and moulds*

EN 12390-2, *Testing hardened concrete - Part 2: Making and curing specimens for strength tests*

EN 12390-3, *Testing hardened concrete - Part 3: Compressive strength of test specimens*

EN 12390-7, *Testing hardened concrete - Part 7: Density of hardened concrete*

EN 12504-1, *Testing concrete in structures - Part 1: Cored specimens - Taking, examining and testing in compression*

EN 12504-2, *Testing concrete in structures - Part 2: Non-destructive testing - Determination of rebound number*

EN 12504-3, *Testing concrete in structures - Part 3: Determination of pull-out force*

EN 12504-4, *Testing concrete - Part 4: Determination of ultrasonic pulse velocity*

EN 13395-1, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of workability - Part 1: Test for flow of thixotropic mortars*

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 13395-3, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of workability - Part 3: Test for flow of repair concrete*

EN 13395-4, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of workability - Part 4: Application of repair mortar overhead*

EN 13670, *Execution of concrete structures*

EN 14038-1, *Electrochemical realkalization and chloride extraction treatments for reinforced concrete - Part 1: Realkalization*

CEN/TS 14038-2, *Electrochemical re-alkalization and chloride extraction treatments for rein-forced concrete - Part 2: Chloride extraction*

EN 14487-1, *Sprayed concrete - Part 1: Definitions, specifications and conformity*

EN 14487-2, *Sprayed concrete - Part 2: Execution*

EN 14629, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of chloride content in hardened concrete*

EN 14630, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of carbonation depth in hardened concrete by the phenolphthalein method*

EN 16242, *Conservation of cultural heritage - Procedures and instruments for measuring humidity in the air and moisture exchanges between air and cultural property*

EN ISO 2409, *Paints and varnishes - Cross-cut test (ISO 2409:2013)*

EN ISO 2808, *Paints and varnishes - Determination of film thickness (ISO 2808:2007)*

EN ISO 3274, *Geometrical product specifications (GPS) - Surface texture: Profile method - Nominal characteristics of contact (stylus) instruments (ISO 3274:1996)*

EN ISO 4288, *Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture (ISO 4288:1996)*

EN ISO 4624, *Paints and varnishes - Pull-off test for adhesion (ISO 4624:2016)*

EN ISO 4628-1, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system (ISO 4628-1:2016)*

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 4628-2:2016)*

EN ISO 4628-3, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting (ISO 4628-3:2016)*

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 4628-4:2016)*

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 4628-5:2016)*

EN ISO 4628-6, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 6: Assessment of degree of chalking by tape method (ISO 4628-6:2011)*

EN ISO 8501-1, *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings (ISO 8501-1:2007)*

EN ISO 8502-4, *Preparation of steel substrates before application of paints and related products - Tests for the assessment of surface cleanliness - Part 4: Guidance on the estimation of the probability of condensation prior to paint application (ISO 8502-4:2017)*

EN ISO 12696, *Cathodic protection of steel in concrete (ISO 12696:2016)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1504-1 and EN 1504-9 and the following apply.

3.1
blasting
removal of matter from the concrete substrate to a depth of approximately 2 mm

3.2
bond
adhesion of the applied product or system to the substrate

3.3
cement grout
mixture of cement, water and in some cases admixtures and fillers

3.4
cementitious repair products and systems
hydraulic or polymer hydraulic mortars, concretes and grouts

3.5
coating
product and/or system for the treatment of concrete to produce a continuous protective layer on the surface

3.6
extent of microcracking
total length of microcracks within a defined area

Note 1 to entry: The area is defined in Annex D.

3.7
dew point
temperature at which water vapour condenses

3.8
double amplitude 2a
distance between the maximum and minimum values in a regular saw-tooth curve characterizing the roughness of the substrate surface

3.9
grit blasting
blasting using abrasive as an additive in air

3.10
hydrophobic impregnation
product for the treatment of concrete to produce a water-repellent surface with little or no change in its appearance

Note 1 to entry: The pores and capillaries are internally coated, but they are not filled. There is no measurable film on the surface of the concrete.

3.11
hydraulic mortars and hydraulic concrete (CC)
mortars or concrete based on a hydraulic binder which is blended together with graded aggregates and may include admixtures and additions which, when mixed with water, set by hydrated reaction

3.12
impregnation

product for the treatment of concrete to reduce the surface porosity and to strengthen the surface

Note 1 to entry: The pores and capillaries are partially or totally filled. This treatment usually leads to a discontinuous, thin film on the concrete surface.

3.13
mechanical removal
removal of substrate by percussive or abrasive means

3.14
micro crack
crack too small to be seen with the unaided eye

Note 1 to entry: Annex D defines 0,03 mm as a minimum width.

3.15
mortars and concrete
hydraulic, polymer hydraulic and polymer mortar and concrete

3.16
non-selective hydrodemolition
removal of concrete to a selected depth by using high pressure water techniques

3.17
polymer hydraulic cement mortars and concrete (PCC)
hydraulic mortars or concrete modified by the addition of a polymer

3.18
polymer mortars and polymer concretes (PC)
blended mixture of polymer binder and graded aggregate which set by polymerisation reaction