

Draft for Public Comment**Head office**

389 Chiswick High Road
London W4 4AL
Telephone: 020 8996 9000
Fax: 020 8996 7400
www.bsi.org.uk

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Draft: prEN 1504-4

**Title: Products and Systems for Protection and repair of Concrete Structures –
Definitions, requirements, quality control and evaluation of conformity –
Part 4: Structural bonding**

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Responsible BSI committee Secretary: Anita Attra

Direct tel: 020 8996 7603

E-mail address: anita.attra@bsi.org.uk

No. 28, 26/04/00

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Commenting on drafts

Introduction

This draft standard is based on European discussions in which the UK took an active part. Your comments on this draft are welcome and will assist in the preparation of the consequent British Standard. If no comments are received to the contrary, then the UK will approve this draft and implement it as a British Standard. Comment is particularly welcome on national legislative or similar deviations that may be necessary.

Even if this draft standard is not approved by the UK, if it receives the necessary support in Europe, the UK will be obliged to publish the official English Language text unchanged as a British Standard and to withdraw any conflicting standard.

UK vote

Please indicate whether you consider the UK should submit a negative (with reasons) or positive vote on this draft.

Format

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Each comment shall make one point only, be clearly separated from the others and be structured as follows in clause order:

- clause/sub-clause;
- paragraph/table/figure number;
- type of comment (general, technical or editorial);
- comment (with rationale);
- proposed change.

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Draft no:	Project no.: 1991/07146	DPC no.: 00/103365DC
Short title:	Commentator:	Date:

Clause/ subclause	Paragraph/ Figure/ Table	Type of comment (General/ technical/editorial)	Comment (with rationale)	Proposed change
Examples:				
3.1	1st definition	Editorial	Definition is ambiguous and needs clarifying.	Amend to read '... so that the mains connector to which no connection ...'
6.4	2nd paragraph	Technical	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK, giving rise to misleadingly high results.	Delete reference to UV photometer.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 1504-4

April 2000

ICS

English version

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

Produits et systèmes pour la protection et la réparation de structures en béton - Définitions, exigences, maîtrise de la qualité et évaluation de la conformité - Partie 4: Collage structural

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Definitionen, Anforderungen, Güteüberwachung und Beurteilung der Konformität - Teil 4: Kleber für Bauzwecke

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 104.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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.

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

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 104 "Concrete Performance, production, placing and compliance", the Secretariat of which is held by DIN.

It has been elaborated by sub-committee 8 "Products and systems for the protection and repair of concrete structures" (Secretariat AFNOR).

The text of the draft standard is to be submitted to enquiry.

This standard does not supersede any other European standard.

This European standard 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 Construction Products Directive (89/106/EC). For relationship with EU Directive, see informative annex ZA, which is an integral part of this 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 1504-1²

Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 1: definitions

prEN 1504-2¹

Products and systems for the protection and repair of concrete structures - Definitions - Requirements - Quality control and evaluation of conformity - Part 2: Surface protection systems

prEN 1504-3¹

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

prEN 1504-5¹

Products and systems for the protection and repair of concrete structures - Definitions - Requirements - Quality control and evaluation of conformity - Part 5: Concrete injection

prEN 1504-6¹

Products and systems for the protection and repair of concrete structures - Definitions - Requirements - Quality control and evaluation of conformity - Part 6: Grouting to anchor reinforcement or to fill external voids

prEN 1504-7¹

Products and systems for the protection and repair of concrete structures - Definitions - Requirements - Quality control and evaluation of conformity - Part 7: Reinforcement corrosion protection

prEN 1504-8¹

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 1504-9²

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 This document is in preparation

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

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prEN 1504-10¹

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

¹) This document is in preparation

1 Scope

This standard specifies requirements for the identification, performance (including durability aspects) and safety of products and systems to be used for the structural bonding of construction materials to a concrete structure.

Compliance with any safety regulations to protect persons and the environment must also be taken into account.

NOTE: It is assumed that a proper structural assessment is carried out by qualified engineers and that the choice of the products and systems to be used as well as the design is based on this assessment.

This standard covers

- 1 The bonding of external plates of steel or other suitable materials to the surface of a concrete structure for strengthening purposes, including the laminating of plates in such applications.
- 2 The bonding of hardened concrete to hardened concrete, typically associated with the use of precast segmental units.
- 3 The bonding of fresh concrete to hardened concrete where it forms a part of the structure and is required to act compositely.

2 Normative References

This European Standard incorporates by dated or undated reference, provisions from other publications. Normative references are cited at the appropriate places in the text and the relevant publications are listed hereafter. For dated references, subsequent amendments to or revisions of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references this European Standard refers to the latest edition of the publication.

EN 1504-1

Products and systems for the protection and repair of concrete structures - Part 1: General scope and definitions.

EN 1504-8

Products and systems for the protection and repair of concrete structures - Part 8: Quality control and evaluation of conformity

EN 1504-9

Products and systems for the protection and repair of concrete structures - Part 9: General principles for the use of products and systems.

EN1766

Products and systems for the protection and repair of concrete structures: Test methods – Reference concretes for testing

EN1767

Products and systems for the protection and repair of concrete structures: Test methods – Infrared analysis

EN1770

Products and systems for the protection and repair of concrete structures: Test methods – Determination of the coefficient of thermal expansion

EN1799

Products and systems for the protection and repair of concrete structures: Test methods – Tests to measure the suitability of structural bonding agents for application to concrete surfaces

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- EN 1878**
Products and systems for the protection and repair of concrete structures: Test methods – Reactive functions of epoxy resins-thermogravimetry of polymers 0 temperature scanning method.
- EN 1879**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of ash by direct calcination.
- EN12188**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of adhesion steel to steel for characterisation of structural bonding agents
- EN12189**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of open time
- EN12190**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of compressive strength
- EN12192-2**
Products and systems for the protection and repair of concrete structures: Test methods – Granulometry size grading: Part 2: Method for fillers for polymer bonding agents
- EN12614**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of glass transition temperature of polymers
- EN12615**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of slant shear strength
- EN12617-1**
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
- EN12617-3**
Products and systems for the protection and repair of concrete structures: Test methods – Part 3: Determination of early age linear shrinkage for structural bonding agents
- pr EN 12618-2**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of the adhesion of injection products; with or without thermal cycling – Part 2: Tensile bond method.
- EN12636**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of adhesion concrete to concrete
- EN 13412**
Products and systems for the protection and repair of concrete structures: Test methods – Determination of modulus of elasticity in compression
- EN29514** [Pot life]
- pr EN 104-851**
Products and systems for the protection and repair of concrete structures: Test methods – Tests to determine the durability of structural bonding agents

pr EN 104-852-1

Products and systems for the protection and repair of concrete structures: Test methods – Determination of fatigue under dynamic loading – Part 1: during cure.

pr EN 104-852-2

Products and systems for the protection and repair of concrete structures: Test methods – Determination of fatigue under dynamic loading – Part 2: in service.

pr EN 104-853

Products and systems for the protection and repair of concrete structures: Test methods - Determination of creep under sustained load in service.

ISO 178 Plastics – Determination of flexural properties

3 Definitions

For the purpose of this standard the following definitions apply in addition to the definitions given in EN 1504-1 and in EN 1504-9:

3.1 Products and systems for bonding

Products and systems applied to concrete to provide a durable structural bond to additional applied material.

3.2 Polymer mortars and Polymer concretes (PC)

Blended mixtures of polymer binder and graded aggregates which set by polymer reaction.

3.3 Identification test

Tests carried out on a component material, product or system to confirm to the user the identity, consistency and fundamental characteristics of the material under test.

3.4 Open time

The period of time that elapses between the completion of mixing of the bonding agent and the longest time to closing of the joint which results in a failure plane within the concrete.

3.5 Pot life

The period of time taken by the mixed bonding agent to reach a specified temperature in the mixing container. Pot life is an identification test carried out under standard laboratory conditions.

3.6 Workable life

The period of time the mixed bonding agent remains workable in the batch quantities used and at the limit of conditions that the material is fit for the purpose of use.

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4 Performance characteristics for intended uses

4.1 General

Table 1 is an overview of performance characteristics of products and systems which are possible for "all and certain intended uses" according to the "principles " and "methods" defined in ENV 1504-9. Performance characteristics which are compulsory for "all intended uses" are marked with ■. All other performance characteristics which are marked with □ may become necessary for "certain intended uses" = certain fields of application.

These performance requirements may not be applicable to highly specialised applications in extreme environmental conditions, e.g. cryogenic use, nor do they cover specialised circumstances such as accidental impact, e.g. due to traffic or ice, or earthquake loading where specific performance requirements will apply.

The properties of the bonding may be adversely affected by fire and therefore appropriate protection measures will need to be taken where fire is anticipated.

Table 1 Performance characteristics for all and certain intended uses

Performance Characteristic	Principle of Repair Structural Strengthening (Note 6)	
	Repair Method 4.3 Bonded Plate Reinforcement (Note 1)	Repair Method 4.4 Bonded Mortar or Concrete (Note 2)
1. Suitability for application : a) to vertical surfaces & soffits b) to top horizontal surfaces c) by injection	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2. Suitability for application and curing under the following special environmental conditions: a) low or high temperature (Note 3) b) wet substrate	<input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>
3. Adhesion: a) plate to plate b) plate to concrete c) corrosion protected steel to corrosion protected steel (Note 4) d) corrosion protected steel to concrete (Note 4) e) hardened concrete to hardened concrete f) fresh concrete to hardened concrete (Note 5)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
4. Durability of composite system: a) thermal cycling b) moisture cycling	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
5. Material characteristics for the designer: a) opentime (note 5))at minimum, standard and b) workable life)maximum application temperatures c) modulus of elasticity in compression d) modulus of elasticity in flexure e) compressive strength f) shear strength g) glass transition temperature h) coefficient of thermal expansion i) shrinkage	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

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Notes

1. The bonding of external plates to the surface of a concrete structure for strengthening purposes, and the laminating of plates in such applications. An acceptable bond is unlikely to be achieved with stainless steel.
2. The bonding of hardened concrete to hardened concrete, typically associated with the use of precast segmental units.

The bonding of fresh concrete to hardened concrete where it forms a significant part of the structure and is required to act compositely.
3. Temperatures may be nominated by the producer for the intended use.
4. In this context corrosion protection implies the application of a corrosion inhibiting priming coat to mild steel.
5. Not applicable to injection technique.
6. ■ = a material characteristic which shall be considered for all intended uses
□ = a material characteristic which shall be considered for certain intended uses

5. Requirements

The requirements specified in this clause are based upon the use of products and systems containing reactive polymer binders.

5.1 Identification requirements

The identification requirements of structural bonding agents are summarised in Table 2.

Table 2 Identification requirements

Property	Test Method	Requirements
Colour	Visual	Uniform and similar to the description provided by the manufacturer.
Granulometry size grading of fillers for polymer bonding agents.	pr EN 12192-2	Declared value ± 5%
Ash content by direct calcination OR Thermogravimetry of polymers: temperature scanning method.	pr EN 1879 pr EN 1878	Declared value ± 5% or ± 1 percentage point of that value, whichever is the smaller.
Infrared analysis of the resin and hardener	pr EN 1767	The positions and relative intensities of the main absorption bands shall match those of the reference spectrum.
Pot life	pr EN 29514	Declared value ± 20%

5.2 Performance requirements

The performance requirements of structural bonding agents are summarised in Tables 3.1 and 3.2

See Annex A (informative), Table 4 for special applications of structural bonding agents.

6 Sampling

The requirements are given in prEN 1504-8.

7 Quality Control

The requirements are given in prEN 1504-8.

8 Marking and labelling

The requirements are given in prEN 1504-8.

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Table 3.1 Performance requirements for bonded plate reinforcement

Performance Characteristic	Reference concrete or mortar	Test Method	Requirements								
Modulus of elasticity in flexure.	-	ISO 178	2000 N/mm ² to 15000 N/mm ²								
Shear strength	-	pr EN 12188	≥ 12 N/mm ²								
Open time	pr EN 1766 MC(0.40)	pr EN 12189	Declared value ± 20%								
Workable life	-	pr EN 29514	Declared value. <i>Informative Note:</i> The workable life is dependent upon the batch quantity and ambient conditions in use. Users should note that the workable life will usually be less than the pot life.								
Modulus of elasticity in compression	-	pr EN 13412	≥ 2000 N/mm ² ≤ 15000 N/mm ² *								
Glass transition temperature	-	pr EN 12614	≥ 45°C or the maximum shade air temperature in service + 20°C, whichever is the higher*								
Coefficient of thermal expansion	-	pr EN 1770	≤ 50 x 10 ⁻⁶ per °C*								
Total shrinkage for structural bonding agents	-	pr EN 12617-1 or pr EN 12617-3	≤ 0.1%*								
Suitability for application to vertical surfaces and soffits	-	pr EN 1799	The material shall not sag flow by more than 1 mm when spread in thicknesses less than 3 mm.								
Suitability for application to horizontal surfaces	-	pr EN 1799	The surface area of the bonding agent at the end of the squeezability test shall not be less than 3000mm ² (60mm diameter).								
Suitability for injection	-	pr EN 12618-2	For the test performed in the dry, failure shall occur in the concrete.								
Suitability for application and curing under special environmental conditions	-	pr EN 12188 Note: the test method may need to be varied for plates other than steel	The slant shear strength of scarf-jointed prisms tested in compression at various angles θ shall not be less than the values σ _o MPa tabulated below. <table style="margin-left: 20px;"> <thead> <tr> <th>θ</th> <th>σ_o (MPa)</th> </tr> </thead> <tbody> <tr> <td>50°</td> <td>50</td> </tr> <tr> <td>60°</td> <td>60</td> </tr> <tr> <td>70°</td> <td>70</td> </tr> </tbody> </table>	θ	σ _o (MPa)	50°	50	60°	60	70°	70
θ	σ _o (MPa)										
50°	50										
60°	60										
70°	70										

* provisional

Table 3.1 (continued) Performance requirements for bonded plate reinforcement

Performance Characteristic	Reference concrete or mortar	Test method	Requirements								
Adhesion	-	pr EN 12188 Note: the test method may need to be varied for plates other than steel	<p>The tensile stress carried by the bonded joint in a pull off test shall not be less than 15 MPa.</p> <p>The slant shear strength of scarf-jointed prisms tested in compression at various angles θ shall not be less than the values σ_0 MPa tabulated below.</p> <table border="1"> <thead> <tr> <th>θ</th> <th>σ_0 (MPa)</th> </tr> </thead> <tbody> <tr> <td>50°</td> <td>50</td> </tr> <tr> <td>60°</td> <td>60</td> </tr> <tr> <td>70°</td> <td>70</td> </tr> </tbody> </table>	θ	σ_0 (MPa)	50°	50	60°	60	70°	70
θ	σ_0 (MPa)										
50°	50										
60°	60										
70°	70										
Durability (thermal and moisture)	pr EN 1766 MC (0.40)	pr EN 13733	<p>The compressive shear load at failure of the hardened concrete specimens after exposure to thermal cycling or the warm-moist environment shall not be less than the tensile strength of the concrete.</p> <p>The fracture energy of the steel to steel specimens after exposure to thermal cycling or the warm-moist environment shall not be less than 0.15 kN/m.</p>								

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Table 3.2 Performance requirements for bonded mortar or concrete

Performance characteristic	Reference concrete or mortar	Test Method	Requirements
Modulus of elasticity in flexure.	-	ISO 178	2000 N/mm ² to 15000 N/mm ²
Compressive strength	-	pr EN 12190	≥30 N/mm ²
Shear strength	-	pr EN 12188	≥6 N/mm ²
Open time	pr EN 1766 MC(0.40)	pr EN 12189	Declared value ± 20%
Workable life	-	pr EN 29514	Declared value. <i>Informative Note:</i> The workable life is dependent upon the batch quantity and ambient conditions in use. As such it is the responsibility of the producer. However, users should note that the workable life will usually be less than the pot life.
Modulus of elasticity in compression	-	pr EN 13412	≥2000 N/mm ² ≤15000 N/mm ²
Glass transition temperature	-	pr EN 12614	≥45°C or the maximum shade air temperature in service +20°C, whichever is the higher *
Coefficient of thermal expansion	-	prEN 1770	≤50 x 10 ⁻⁶ per °C*
Total shrinkage for structural bonding agents	-	pr EN 12617-1 or pr EN 12617-3	≤0.1%*
Suitability for application to vertical surfaces and soffits	-	pr EN 1799	The material shall not sag flow by more than 1 mm when spread in thicknesses less than 3 mm.
Suitability for application to horizontal surfaces	-	pr EN 1799	The surface area of the bonding agent at the end of the squeezability test shall not be less than 3000mm ² .
Suitability for injection	-	pr EN 12618-2	For the test performed in the dry failure shall occur in the concrete.
Suitability for application and curing under special environmental conditions	pr EN 1766 MC (0.40) pr EN 1766 C(0.40) or MC (0.40)	Either: pr EN 12636 or: pr EN 12615	For hardened concrete-to-hardened concrete, the tensile bending test shall result in fracture in the concrete For fresh concrete-to-hardened concrete, the pull off test shall result in fracture in the concrete. The slant shear test shall result in fracture in the concrete.

* provisional

Table 3.2 (continued) Performance requirements for bonded mortar or concrete

Property	Reference concrete or mortar	Test method	Requirements
Adhesion	pr EN 1766 MC (0.40) pr EN1766 C (0.40) or MC (0.40)	Either: pr EN 12636 or: pr EN 12615	For hardened concrete-to-hardened concrete, the tensile bending test shall result in fracture in the concrete. For fresh concrete-to-hardened concrete, the pull off test shall result in fracture in the concrete. The slant shear test shall result in fracture in the concrete.
Durability (thermal and moisture)	pr EN1766 MC (0.40)	pr EN 13733	The compressive shear load at failure of either the hardened concrete to hardened concrete or fresh concrete to hardened concrete specimens after exposure to thermal cycling or the warm-moist environment shall not be less than the tensile strength of the fresh or hardened concrete, whichever is the lesser.

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Annex ZA (informative) Harmonized clauses, attestation of conformity and CE marking

ZA.1 Clauses of this European Standard addressing the provisions of EU Construction Products Directive

This European Standard has been prepared under a Mandate given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in the table below, meet the requirements of the Mandate given under the EU Construction Products Directive (89/106).

Compliance with these clauses confers a presumption of fitness of the construction product covered by this European Standard for its intended use(s).

WARNING: Other requirements and other EU Directives, not affecting the fitness of intended use(s), can be applicable to the construction product falling within the scope of this European Standard.

Construction product: Structural bonding products
Intended uses: used for structural strengthening by bonded plate reinforcement and bonded mortar or concrete.

Requirement/Characteristic from the Mandate:	Requirement Clause(s) in this or other European Standard(s):	Mandate levels and/or classes	Notes
- Bond / adhesion strength))	wr
- Shear strength))	
- Compressive strength) Test methods)	wr
- Shrinkage / expansion) included in)	
- Workability) Paragraph 5.2) None	
- Sensitivity to water (incl. seawater)) Table 3)	
- Modulus of elasticity))	
- Coefficient of thermal expansion))	
- Glass transition temperature))	
- Reaction to fire))	wr

NOTE Limiting values or classes, if any, referred to under these clauses in the standard are not to be taken into account except if they are recognized as classes and levels according to Article 3.2 of the CPD, as specified in the mandate, or later agreed by the Standing Committee according to Article 20.2 of the CPD, following a CEN proposal. wr = where relevant

ZA.2 Procedure for the attestation of conformity of products

Product	Intended use	Level(s) or Class(es)	Attestation of conformity
Structural bonding products	For uses with low performance requirements in buildings and in civil engineering works	none	4
	For other uses in buildings and civil engineering works		2+
System 2+ : See CPD Annex 111.2(ii) First possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as continuous surveillance assessment and approval of factory production control.			
System 4: See CPD Annex 111 2(ii). Third possibility			

The evaluation of conformity of the surface protection products covered by this European Standard shall be assessed following clause 7.

ZA.3 CE marking and labelling

CE marking shall be fixed following clause 8 which gives guidance on the characteristics that have to be stated within the labelling that will accompany the CE marking in compliance with the intended use of the product and on the way of expressing the values on these characteristics where required.

Accompanying the CE marking, the manufacturer shall mention the following information on the commercial documents accompanying the product:

- Name, or identify mark, and the address of the manufacturer
- Last two digits of the year in which the marking was fixed
- EN 1504 – 4: Structural bonding products
- For the system 2+ : number of the CE certificate of conformity delivered by the certification body and 1st identification number
- For the system 2+ : identification number of the body involved in FPC
- Bond/Adhesion strength
- Shear strength
- Compressive strength : where relevant
- Shrinkage/expansion
- Workability
- Sensitivity to water : where relevant
- Modulus of elasticity
- Coefficient of thermal expansion
- Glass transition temperature
- Reaction to fire : where relevant

NOTE For those characteristics that are not declared by the manufacturer for given intended uses and for which there are no requirements in a Member State of destination, the corresponding boxes do not need to be completed.

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Annex A (Informative)**Table 4 Special applications**

Property	Test Method
Fatigue under dynamic loading during cure and in service	pr EN 104-852-1 pr EN 104-852-2
Creep under sustained loading in service	pr EN 13584-1