

**Products and systems for the
protection and repair of concrete
structures - Test methods -
Determination of thermal compatibility -
Part 4: Dry thermal cycling**

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of concrete structures - Test methods -
Determination of thermal compatibility - Part 4: Dry
thermal cycling

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 13687-4:2002 sisaldab Euroopa standardi EN 13687-4:2002 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 16.05.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 13687-4:2002 consists of the English text of the European standard EN 13687-4:2002.</p> <p>This document is endorsed on 16.05.2002 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>This standard is the fourth in a series of five parts to assess the thermal compatibility of repair products and systems, comprising grouts, mortars and concretes and surface protection systems, used for the repair and protection of concrete structures. The method measures the effect of dry thermal cycling without exposure to de-icing salt, upon the repair product or system. The method is suitable for repair products and systems based on CC, PCC and PC binders and for surface protection systems.</p>	<p>Scope:</p> <p>This standard is the fourth in a series of five parts to assess the thermal compatibility of repair products and systems, comprising grouts, mortars and concretes and surface protection systems, used for the repair and protection of concrete structures. The method measures the effect of dry thermal cycling without exposure to de-icing salt, upon the repair product or system. The method is suitable for repair products and systems based on CC, PCC and PC binders and for surface protection systems.</p>
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Võtmesõnad: concrete components, concretes, protection, protective equipment, reinforcing steels, repair, structures, surface protection, temperature behaviour, temperature loadability, testing, thermal test

ICS 91.080.40

English version

**Products and systems for the protection and repair of concrete
structures - Test methods - Determination of thermal
compatibility - Part 4: Dry thermal cycling**

Produits et systèmes pour la protection et la réparation des
structures en béton - Méthodes d'essai - Détermination de
la compatibilité thermique - Partie 4: Cycles thermiques à
sec

Produkte und Systeme für den Schutz und die
Instandsetzung von Betontragwerken - Prüfverfahren -
Bestimmung der Temperaturwechselverträglichkeit - Teil 4:
Trockene Temperaturwechselbeanspruchung

This European Standard was approved by CEN on 23 December 2001.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document EN 13687-4 has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

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 August 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

It has been prepared by sub-committee 8 "Products and systems for the protection and repair of concrete structures" the secretariat of which is held by AFNOR.

This Part of this European Standard describes a method of test for determining the thermal compatibility of grouts, mortars and concretes or surface protection systems applied to a standard concrete, by dry thermal cycling between 55 °C and -25 °C without contact with de-icing salt or water. It is one of a series of inter-related parts dealing with the thermal compatibility of repair products and systems. The other parts in this standard are :

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.*

Annex A is normative.

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

1 Scope

This standard is the fourth in a series of five parts to assess the thermal compatibility of repair products and systems, comprising grouts, mortars and concretes and surface protection systems, used for the repair and protection of concrete structures. The method specified in this Part measures the effect of dry thermal cycling without exposure to de-icing salt, upon the repair product or system. The method is suitable for repair products and systems based on CC, PCC and PC binders and for 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).

EN 196-1, *Methods of testing cement – Part 1: Determination of strength*.

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

prEN 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 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*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1504-1 apply.

4 Test principle

A layer of the repair grout, mortar and concretes and/or the surface protection system is applied to a reference concrete test specimen prepared according to EN 1766. After curing, the test specimen is subjected to freeze-thaw cycling in air at temperatures of between 55 °C and -25 °C. Following the temperature cycling, visible defects (cracking, peeling, chalking etc) are recorded and the adhesion of the repair product or system to the concrete substrate is determined by pull-off test (according to EN 1542).

5 Apparatus

5.1 Laboratory, maintained at the standard laboratory climate of (21 ± 2) °C and (60 ± 10) % RH (see annex A).

5.2 Mixer, for mixing the constituents of the mortar. Unless stated otherwise by the manufacturer, use a forced action pan mixer.

5.3 Concrete test specimens, of dimensions of 300 mm x 300 mm x 100 mm to EN 1766 and type as specified in prEN 1504-2 or prEN 1504-3.