

**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**

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of concrete structures - Test methods -
Determination of thermal compatibility - Part 1:
Freeze-thaw cycling with de-icing salt immersion

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 13687-1:2002 sisaldab Euroopa standardi EN 13687-1:2002 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 12.07.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 13687-1:2002 consists of the English text of the European standard EN 13687-1:2002.</p> <p>This document is endorsed on 12.07.2002 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 European Standard is the first of five parts to assess the thermal compatibility of repair products and systems, including grouts, mortars and surface protection systems, used for the repair and protection of concrete structures.</p>	<p>Scope:</p> <p>This European Standard is the first of five parts to assess the thermal compatibility of repair products and systems, including grouts, mortars and surface protection systems, used for the repair and protection of concrete structures.</p>
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Võtmesõnad: concrete components, concretes, deicing salt, frost resistance, frost-thaw alternating tests, protection, protection systems, repair, structures, surface protection, testing, thermal stress, thermal test

English version

**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**

Produits et systèmes pour la protection et la réparation des
structures en béton - Méthodes d'essai - Détermination de
la compatibilité thermique - Partie 1: Cycles de gel-dégel
avec immersion dans des sels déglçants

Produkte und Systeme für den Schutz und die
Instandsetzung von Betontragwerken - Prüfverfahren -
Bestimmung der Temperaturwechselverträglichkeit - Teil 1:
Frost-Tau-Wechselbeanspruchung mit Tausalzangriff

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.



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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document EN 13687-1:2002 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 and surface protection systems applied to a standard concrete, by shock cycling between 21 °C and –15 °C, including immersion in saturated de-icing salt solution. It is one of a series of inter-related parts dealing with the thermal compatibility of repair products and systems. The other parts of this standard are :

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 13687-4, *Products and systems for the protection and repair of concrete structures - Test methods - Determination of thermal compatibility - Part 4: Dry thermal cycling.*

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 European Standard is the first of five parts to assess the thermal compatibility of repair products and systems, including 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 freeze-thaw thermal shock cycling with immersion in saturated de-icing salt solution. 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 1766, *Products and systems for the protection and repair of concrete structures - Test methods - Reference concretes for testing*.

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

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 or concretes or the surface protection system (or both) is applied to a reference concrete test specimen prepared according to EN 1766. After curing, the test specimen is subjected to freeze-thaw thermal shock cycling between $(21 \pm 2) ^\circ\text{C}$ and $(-15 \pm 2) ^\circ\text{C}$, including immersion in saturated de-icing salt solution. Following the temperature cycling, visible defects are recorded and the adhesion of the repair product or system to the concrete substrate is determined by pull-off test.

5 Apparatus

5.1 Laboratory, maintained at the standard laboratory climate of $(21 \pm 2) ^\circ\text{C}$ and $(60 \pm 10) \% \text{ RH}$ (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 300 mm x 300 mm x 100 mm to EN 1766 and type as specified in prEN 1504-2 or prEN 1504-3.