

**Thermal performance of buildings -
Qualitative detection of thermal
irregularities in building envelopes -
Infrared method**

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envelopes - Infrared method

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 13187:2001 sisaldab Euroopa standardi EN 13187:1998 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 13187:2001 consists of the English text of the European standard EN 13187:1998.</p> <p>This document is endorsed on 18.06.2001 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 specifies a qualitative method, by thermographic examination, for detecting thermal irregularities in building envelopes. The method is used initially to identify wide variations in the thermal properties, including air tightness, of the components constituting the external envelopes of buildings.</p> <p>The results obtained by means of this method have to be interpreted and assessed by persons who are specially trained for this purpose.</p> <p>The standard does not apply to the determination of the degree of thermal insulation and air tightness of the structure.</p>	<p>Scope:</p> <p>This standard specifies a qualitative method, by thermographic examination, for detecting thermal irregularities in building envelopes. The method is used initially to identify wide variations in the thermal properties, including air tightness, of the components constituting the external envelopes of buildings.</p> <p>The results obtained by means of this method have to be interpreted and assessed by persons who are specially trained for this purpose.</p> <p>The standard does not apply to the determination of the degree of thermal insulation and air tightness of the structure.</p>
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Võtmesõnad: buildings, defects, fault detectors, infrared radiation, quality control, tests, thermal insulation, walls

ICS 91.120.10

English version

Thermal performance of buildings
**Qualitative detection of thermal irregularities in
building envelopes – Infrared method**
(ISO 6781 : 1983, modified)

Performance thermique des
bâtiments – Détection qualitative des
irrégularités thermiques sur les
enveloppes de bâtiments – Méthode
infrarouge (ISO 6781 : 1983, modifiée)

Wärmetechnisches Verhalten von
Gebäuden – Nachweis von Wärme-
brücken in Gebäudehüllen –
Infrarot-Verfahren (ISO 6781 : 1983,
modifiziert)

This European Standard was approved by CEN on 1998-11-12.

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 Central Secretariat or to any CEN member.

The European Standards exist 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.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS.

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 May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It is based on International Standard ISO 6781:1983, Thermal insulation - Qualitative detection of thermal irregularities in building envelopes - Infrared method, which was modified to take account of the development of equipment performance and inspection practice. The main modification is the addition of a procedure for "Simplified testing with an IR camera".

This standard is one of series of standards for the design and evaluation of thermal performance of buildings and building components.

Introduction

Irregularities in the thermal properties of the components constituting the external envelope of a building result in temperature variations over the surfaces of the structure. The surface temperature is also influenced by air flow within and/or through the envelope of the building. The surface temperature distribution can thus be used to detect thermal irregularities due, for example, to insulation defects, moisture content and/or air leakage, in the components constituting the external envelope of the building.

Building thermography is a method of indicating and representing the temperature distribution over a part of the surface of a building envelope. In the context of this standard, thermography is carried out by means of an infrared radiation sensing system which produces an image based on the apparent radiance temperature of the measured target area. The thermal radiation (infrared radiation density) from the target area is converted by the infrared radiation sensing system to produce a thermal image representing the relative intensity of thermal radiation from different parts of the surface. The intensity of the image is a function of the surface temperature, the characteristics of the surface, the ambient conditions and the sensor itself. The measurement procedure also involves interpretation of the thermal images (thermograms).

1 Scope

This standard specifies a qualitative method, by thermographic examination, for detecting thermal irregularities in building envelopes. The method is used initially to identify wide variations in the thermal properties, including air tightness, of the components constituting the external envelopes of buildings.

In this standard two forms of thermography are specified:

Testing with an IR camera is primarily intended for the inspection of the overall performance of new buildings or the result after a rebuilding operation.

Simplified testing with an IR camera is suitable when carrying out audits, e.g. at the site of a rebuilding project or at production control or other routine inspections.

These two adaptations differ mainly with regard to the reporting and the presentation of results.

The results obtained by means of this method have to be interpreted and assessed by persons who are specially trained for this purpose.

This standard applies to the determination of the location of thermal irregularities and to the location of air leakage paths through the enclosure. This standard does not apply to the determination of the degree of thermal insulation and air tightness of a structure. For such determinations, examinations by other methods are required.

2 Normative references

This 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 standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 7345 Thermal Insulation - Physical quantities and definitions (ISO 7345:1987)
EN ISO 9288 : 1996 Thermal insulation - Heat transfer by radiation - Physical quantities and definitions (ISO 9288:1989)

3 Definitions

For the purposes of this standard, the definitions in EN ISO 7345 and EN ISO 9288 the following definitions apply:

3.1 thermography: Determination and representation of surface temperature distribution by measuring the infrared radiant density from a surface, including interpretation of casual mechanisms producing the irregularities in the thermal images.

3.2 thermal image: Image which is produced by an infrared radiation sensing system and which represents the apparent radiance temperature distribution over a surface.

3.3 thermogram: A thermal image, documented by a photograph of the camera display, by a recording on a video tape or a digital data diskette or as a file on a computer or hard disk drive.

3.4 total radiance: Radiant heat flow rate divided by the solid angle around the direction $\vec{\Delta}$ and the projected area normal to this direction. [EN ISO 9288:1996]

NOTE: Radiance includes emitted radiation from a surface as well as reflected and transmitted radiation.

3.5 apparent radiance temperature: Temperature determined from the measured total radiance.

NOTE: This temperature is the equivalent black body temperature which would produce the same total radiance.

3.6 isotherm image: Thermal image with isotherms.

3.7 isotherm: A region on the display consisting of points, lines or areas having the same infrared radiation density.

3.8 IR camera: An infrared radiation sensing system which produces a thermal image based on the apparent radiance temperature