
**Performance of buildings — Detection
of heat, air and moisture irregularities
in buildings by infrared methods —**

**Part 1:
General procedures**

*Performance des bâtiments — Détection d'irrégularités de chaleur,
air et humidité dans les bâtiments par des méthodes infrarouges —*

Partie 1: Modes opératoires généraux



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for whom a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC1, *Test and measurement methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 89, *Thermal performance of buildings and building components*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO 6781:1983, which has been technically revised.

The main changes are as follows:

- now comprises the first part of the ISO 6781 series, which addresses the general user of thermography and provides general requirements pertinent to thermography;

NOTE Further parts of the ISO 6781 series provide specific thermographic requirements pertinent to thermographic practitioners, and the technical requirement for thermography of specific types of buildings.

- covers general requirements concerning detection of air leakage and moisture anomalies, using thermographic methods, in addition to thermal anomalies;
- thoroughly updates the thermographic requirements resulting from the vast technological upgrades in thermography since ISO 6781:1983 was published;
- provides general information and specific constraints concerning qualitative thermography and quantitative thermography;
- provides general information and requirements regarding the qualification of thermographic operators and report writers.

A list of all parts in the ISO 6781 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Infrared building thermography provides a tool to qualitatively identify the presence of energy-wasting defects and anomalies within building structures. These defects and anomalies can include, for example, thermal insulation defects, moisture content, and / or unwanted air movement or leakage within the building enclosure.

Building thermography is carried out by means of an infrared thermography camera, which produces an image based on the apparent radiance temperature of the target surface area. The thermal radiation (infrared radiation density) from the target area is converted by the infrared thermography camera to produce a thermal image (thermogram). This image (thermogram) represents the relative intensity of thermal radiation from different parts of the surface. The radiation intensity indicated by the image is related directly to

- a) the surface temperature distribution,
- b) the characteristics of the surface,
- c) the ambient conditions, and
- d) the sensor itself.

As a result, surface temperature distribution can be a key parameter for monitoring the performance of building components, building enclosure and the diagnostics of problems. In use, via analysis of surface temperature distributions, irregularities in the heat and moisture properties of building enclosures and components, and air movement within the building enclosure, can be indicated. These irregularities can be due to, for example, thermal insulation defects, moisture content, air leakage within components or through assemblies, or incorrect installation of components which comprise the construction of the building.

To realize its full utility as an initial qualitative screening technique, or an in-depth diagnostic technique, thermography must often be supported and/or validated by other methods. These methods include, but are not limited to, infrared photosensitive tracer gas methods, fan pressurization of the building enclosure, heat-flow metres, smoke diffusion, anemometry, moisture metres and relative humidity (RH) sensors.

Infrared building thermography inspection methodologies can be used for either new-construction quality control applications or in existing buildings as ongoing condition monitoring for periodic or specific building-condition reporting. The latter applications may be accompanied with visual fault symptoms, while the former may not necessarily present symptoms via visual faults.

Performance of buildings — Detection of heat, air and moisture irregularities in buildings by infrared methods —

Part 1: General procedures

1 Scope

This document specifies requirements and methodologies for infrared thermographic services for detection of heat, air and moisture irregularities in buildings that help users to specify and understand

- a) the extent of thermographic services required,
- b) the type and condition of equipment available for use,
- c) the qualifications of equipment operators, image analysts, and report authors and those making recommendations, and
- d) the reporting of results.

It provides guidance to understanding and utilizing the final results stemming from provision of the thermographic services.

This document is applicable to the general procedures for infrared thermographic methods as can be applied to residential, commercial, and institutional and special use buildings.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6781-3, *Performance of buildings — Detection of heat, air and moisture irregularities in buildings by infrared methods — Part 3: Qualifications of equipment operators, data analysts and report writers*

ISO 7345, *Thermal performance of buildings and building components — Physical quantities and definitions*

ISO 9288, *Thermal insulation — Heat transfer by radiation — Vocabulary*

ISO 9869-1, *Thermal insulation — Building elements — In-situ measurement of thermal resistance and thermal transmittance — Part 1: Heat flow meter method*

ISO 9972, *Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method*

ISO 10878, *Non-destructive testing — Infrared thermography — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 7345, ISO 9288, ISO 10878 and the following apply.