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**Toplotne značilnosti stavb - Preskušanje dokončanih stavb na mestu vgradnje - 1.
del: Zbiranje podatkov za preskus skupnih toplotnih izgub**

Thermal performance of buildings - In situ testing of completed buildings - Part 1: Data collection for aggregate heat loss test

Thermische Leistung von Gebäuden - In-situ-Tests von fertiggestellten Gebäuden - Teil 1: Datenerfassung für den Gesamtwärmeverlusttest

Performance thermique des bâtiments - Essais in situ des bâtiments achevés - Partie 1 : Collecte de données pour l'essai de déperdition thermique globale

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**Thermal performance of buildings - In situ testing of
completed buildings - Part 1: Data collection for aggregate
heat loss test**

Performance thermique des bâtiments - Essais in situ
des bâtiments achevés - Partie 1 : Collecte de données
pour l'essai de déperdition thermique globale

Thermisches Verhalten von Gebäuden - In-situ-Prüfung
fertiggestellter Gebäude - Teil 1: Datenerhebung für
den Gesamtwärmeverlusttest

This European Standard was approved by CEN on 27 February 2024.

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EN 17887-1:2024 (E)**European foreword**

This document (EN 17887-1:2024) 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of an identical text or by endorsement, at the latest by November 2024, and conflicting national standards shall be withdrawn at the latest by November 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

The world's energy resources are being consumed at a significant rate that will result in the depletion of non-renewable resources and increased carbon dioxide emissions. It is imperative that energy be conserved. The building sector, through its use of energy, represents up to 40 % of total energy consumption (in mild climates, where heating and cooling correspond to the major energy demand in buildings). Conservation of energy in buildings can result in a slowing down of non-renewable resource usage and consequently of the build-up of greenhouse gases.

A critical contribution to the conservation of energy in buildings is made by minimizing the heat loss from a building. This is achieved by creating building envelopes that are both airtight and highly insulated. Standardized test methods exist for establishing the *in situ* air permeability or air leakage rate of a building (EN 7726 and EN ISO 9972). This document provides a method for measuring the total *in situ* heat loss from a building. The total heat loss is a combination of the heat lost through air infiltration and envelope heat transfer, and since the air infiltration rate can be measured and the heat loss associated with this approximated, the value for envelope heat transfer can be estimated, together with their combined uncertainty.

In the design process for new buildings, and increasingly for refurbishment, an energy consumption calculation is carried out; normally this uses a calculated value for total heat loss based upon assumptions regarding air infiltration rates and calculated U-values for the external plane building elements and openings, and Ψ values for thermal bridges at the junctions with the plane elements (e.g. openings, intermediate floors). The assumptions on air infiltration can be confirmed by testing to standardized methodologies and the design calculation is often adjusted after testing to include the actual measured air permeability or air leakage rate of the building that is achieved once construction is complete. This document provides a test methodology that will allow the actual *in situ* completed building aggregate heat loss to be quantified. It will reflect the influence of design and workmanship on the constructed building and its constituent parts. Specially constructed test samples representing single construction elements are outside the scope of this document.

The building aggregate heat loss test methodology can be used for the general confirmation of energy performance, as may be required by the building certifier or consumer. It can also enable a comparison to be made between the measured aggregate *in situ* heat loss figure and the calculated values that are currently used.

Without a building aggregate heat loss test methodology, there is currently no way to check and confirm actual energy performance *in situ*. Consequently, this could lead to the adoption of practices in both design and workmanship that could make the calculated values invalid or inappropriate. In addition, wider scale assumptions regarding the potential reductions in energy consumption that could be achieved through the provision of new and refurbished energy efficient buildings, would be made on the basis of calculated building performance, without validation by confirmation of actual aggregate *in situ* performance.

This test methodology can be used as a sample confirmation methodology for large volume production, confirmation of prototypes, confirmation of the performance of particularly significant buildings and potentially as a diagnostic tool to identify the indicative performance of individual elements within a building and inform further investigation and action.

This document is highly linked with EN 17887-2:2024, to which it is applicable to exclusively. It is also complimentary to EN 17888-1:2024, which deals exclusively with opaque building structures especially built for the purpose of *in situ* testing.

EN 17887-1:2024 (E)**1 Scope**

This document specifies a test method for the *in-situ* measurement of the thermal performance of buildings, both newly built and existing.

This document specifies the data to be collected during and after the test.

NOTE The analysis of the data and the reporting format for the analysis are referred to in FprEN 17887-2:2022 *Thermal performance of buildings — In situ testing of completed buildings — Part 2: Steady-state data analysis for aggregate heat loss test*.

This document is applicable to domestic scale detached buildings and attached domestic scale buildings, such as semi-detached houses, terraced houses and apartments. Specially constructed test samples representing single construction elements are outside the scope of this document.

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.

EN IEC 62053-21, *Electricity metering equipment (a.c.) - Particular requirements - Part 21 : static meters for AC active energy (classes 0,5, 1 and 2)* (IEC 62053-21)

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

EN ISO 9229, *Thermal insulation — Vocabulary (ISO 9229)*

EN ISO 9972:2015, *Thermal performance of buildings — Determination of air permeability of buildings — Fan pressurization method (ISO 9972:2015)*

EN ISO 15927-1:2003, *Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 1: Monthly and annual means of single meteorological elements (ISO 15927-1: 2003)*

ISO 9060, *Solar energy — Specification and classification of instruments for measuring hemispherical solar and direct solar radiation*

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

EN 17887-2:2024, *Thermal performance of buildings — In situ testing of completed buildings — Part 2: Steady-state data analysis for aggregate heat loss test*

3 Terms, definitions, symbols and units

For the purposes of this document, the terms and definitions given in EN ISO 7345, EN ISO 9229 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

aggregate heat loss

total rate of heat loss attributable to an entire building fabric obtained by measurement of the aggregate heat loss rates from plane elements, thermal bridges and air infiltration

3.1.2

aggregate heat loss test

metric of a building's thermal performance capable of measuring the heat loss attributable to a building fabric according to this test standard

3.1.3

aggregate heat transfer coefficient

sum of the transmission and infiltration component of the ventilation heat transfer coefficient based upon measurement according to this test standard

3.1.4

air leakage rate

air flow rate across the building envelope

Note 1 to entry: This movement includes flow through joints, cracks and porous surfaces, or a combination thereof, induced by air-moving equipment used in this International Standard.

[SOURCE: EN ISO 9972:2015, 3.1.1]

3.1.5

air permeability

air leakage rate per the envelope area across the building envelope

[SOURCE: EN ISO 9972:2015, 3.1.4]

3.1.6

external (internal) air temperature

temperature of the external (internal) air measured by external (internal) air temperature sensor

3.1.7

habitable room

room that is continuously used for living, working, meeting, amusement and other purposes similar thereto

Note 1 to entry: Spaces such as bathroom, washroom, toilet, entrance hall or corridor are excluded.

EN 17887-1:2024 (E)**3.1.8****heat transfer coefficient**

heat flow rate divided by temperature difference between two environments

Note 1 to entry: specifically used for heat transfer coefficient by transmission or ventilation

[SOURCE: EN ISO 13789:2017, 3.5]

3.1.9**infiltration air**

uncontrolled passage of air into a space through leakage paths in the building envelope

3.1.10**internal room temperature**

air temperature measured at the geometric centre of the room

3.1.11**internal building temperature**

mean air temperature of all of the measured internal room temperatures

3.1.12**temperature difference**

difference between the internal building temperature and external air temperature

3.1.13**test set point internal temperature**

internal building air temperature required to achieve the minimum temperature difference for the duration of the test

3.1.14**quasi steady-state**

state under which the internal conditions within the test building are maintained constant, whilst the external conditions are allowed to vary.

Note 1 to entry: In such a state, transient stages within the test building are minimised

3.1.15**solar heat gain**

heat provided by solar radiation entering, directly or indirectly (after absorption in building elements), into the building through windows, opaque walls and roofs, or passive solar devices such as sunspaces, transparent insulation and solar walls

Note 1 to entry: Active solar devices such as solar collectors are considered as part of the technical building system.

[SOURCE: ISO 52000-1:2017, 3.6.10]

3.1.16**test building**

building where the test is being performed

3.1.17**thermal envelope**

elements of a building that enclose conditioned spaces through which thermal energy is transferred to or from the external environment or to or from unconditioned spaces