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Hygrothermal performance of building materials and products — Determination of hygroscopic sorption properties

Performance hygrothermique des matériaux et produits pour le bâtiment — Détermination des propriétés de sorption hygroscopique

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Foreword

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This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment* Subcommittee SC 1, *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 third edition cancels and replaces the second edition (ISO 12571:2013), which has been technically revised.

The main changes are as follows:

— Table A.1 was revised.

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Hygrothermal performance of building materials and products — Determination of hygroscopic sorption properties

1 Scope

This document specifies two alternative methods for determining hygroscopic sorption properties of porous building materials and products:

a) using desiccators and weighing cups (desiccator method);

b) using a climatic chamber (climatic chamber method).

The desiccator method is the reference method.

This document does not specify the method for sampling.

The methods specified in this document can be used to determine the moisture content of a sample in equilibrium with air at a specific temperature and humidity.

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 9346, *Hygrothermal performance of buildings and building materials — Physical quantities for mass transfer — Vocabulary*

ISO 12570, *Hygrothermal performance of building materials and products — Determination of moisture content by drying at elevated temperature*

3 Terms and definitions, symbols and units

For the purposes of this document, the terms and definitions given in ISO 9346 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
equilibrium moisture content
moisture content of a porous material in equilibrium with the environment and the relative humidity of the ambient air, at a specified temperature

3.1.2
moisture content mass by mass
mass of evaporable water divided by mass of dry material

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3.1.3
moisture content volume by volume
volume of evaporable water divided by volume of dry material

3.1.4
moisture content mass by volume
mass of evaporable water divided by volume of dry material

Note 1 to entry: The mass of water is determined by weighing the specimen before and after drying at the appropriate drying temperature until constant mass is reached.

3.1.5
sorption curve
curve established at a series of increasing equilibrium relative humidities at a given temperature

3.1.6
desorption curve
curve established at a series of decreasing equilibrium relative humidities at a given temperature

3.2 Symbols and units

Symbol	Quantity	Unit
m	mass of test specimen	kg
m_0	mass of dried test specimen	kg
u	moisture content mass by mass	kg/kg
ψ	moisture content volume by volume	m^3/m^3
w	moisture content mass by volume	kg/m^3

4 Principle

4.1 Sorption curve

The specimen is dried to constant mass. While maintaining a constant temperature, the specimen is placed consecutively in a series of test environments, with relative humidity increasing in stages. The moisture content is determined when equilibrium with each environment is reached. At this point, a uniform moisture distribution in the sample is assumed. Equilibrium with the environment is established by weighing the specimen until constant mass is reached. A minimum of four test atmospheres shall be selected in the humidity range under consideration.

After establishing the moisture content at each relative humidity, the sorption curve can be drawn.

4.2 Desorption curve

The starting point for desorption is a relative humidity of at least 95 %. See 7.2.3 for the procedure to define a consistent initial condition. While maintaining a constant temperature, the specimen is placed consecutively in a series of test environments, with relative humidity decreasing in stages. The moisture content is determined when equilibrium with each environment is reached. Equilibrium with the environment is established by weighing the specimen until constant mass is reached. A minimum of four test atmospheres shall be selected in the humidity range under consideration. Finally, the specimen is dried to constant mass.

After establishing the moisture content at each relative humidity, the desorption curve can be drawn.

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