ASTM

Designation: C 870 – 96

Standard Practice for
Conditioning of Thermal Insulating Materials[1]

This standard is issued under the fixed designation C 870; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the conditioning of thermal insulating materials for tests. Since prior exposure of insulating materials to high or low humidity may affect the equilibrium moisture content, a procedure is also given for preconditioning the materials.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 168 Terminology Relating to Thermal Insulating Materials[2]

E 41 Terminology Relating to Conditioning[3]

E 171 Specification for Standard Atmospheres for Conditioning and Testing Flexible Barrier Materials[4]

E 337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)[5]

2.2 *ISO Standard:*[6]

ISO 544 Standard Atmospheres for Conditioning and/or Testing

3. Terminology

3.1 *Definitions*—Definitions of terms in the field of thermal insulating materials are given in Terminology C 168. The following definitions are derived from Terminology E 41:

3.1.1 *moisture content*—the moisture present in a material, as determined by definite prescribed methods, expressed as a percentage of the mass of the sample on either of the following bases: (1) original mass (see 3.1.1); (2) moisture-free weight (see 3.1.2).

3.1.1.1 *Discussion*—This is variously referred to as moisture content, or moisture "as is" or "as received."

3.1.1.2 *Discussion*—This is also referred to as moisture regain (frequently contracted to "regain"), or moisture content on the "oven-dry," "moisture-free," or "dry" basis.

3.1.2 *moisture equilibrium*—the condition reached by a sample when the net difference between the amount of moisture sorbed and the amount desorbed, as shown by a change in mass, shows no trend and becomes insignificant.

3.1.2.1 *Discussion*—Superficial equilibrium with the film of air in contact with the specimen is reached very rapidly. Stable equilibrium can be reached in a reasonable time only if the air to which the sample is exposed is in motion. Stable equilibrium with air in motion is considered to be realized when successive weighings do not show a progressive change in mass greater than the tolerances established for the various insulating materials.

3.1.3 *moisture regain*—the moisture in a material determined under prescribed conditions, and expressed as a percentage of the mass of the moisture-free specimen.

3.1.3.1 *Discussion*—Moisture regain calculations are commonly based on the mass of a specimen that has been dried by heating in an oven. If the air in the oven contains moisture, the oven-dried specimen will contain some moisture even when it no longer shows a significant change in mass. In order to ensure that the specimen is moisture-free, it must be exposed to desiccated air until it shows no further significant change in its mass. For drying temperatures above 100°C (212°F), the moisture content of the oven atmosphere is negligible.

3.1.3.2 *Discussion*—Moisture regain may be calculated from moisture content using Eq 1, and moisture content may be calculated from moisture regain using Eq 2 as follows:

$$R = \frac{C}{100 - C} \times 100 \qquad (1)$$

$$C = \frac{R}{100 + R} \times 100 \qquad (2)$$

where:

C = moisture content, % (see 3.1.1), and
R = moisture regain, % (see 3.1.3).

3.2 *Definitions of Terms Specific to This Standard*—The following descriptions apply only to the usage of terms in this practice:

3.2.1 *conditioned moisture equilibrium*—The moisture condition reached by a sample or specimen during free exposure to moving air controlled at specified conditions. For test purposes,

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