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Standard Terminology Relating To Conditioning[1]

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1. Scope

1.1 These definitions pertain to the conditioning of materials for test purposes. Unless otherwise specified, they are intended to apply to all cases where combinations of atmospheric influences are an essential part of the testing of materials.

1.2 It is the intent of this standard to include those conditioning terms in wide use in ASTM for which standard definitions appear desirable.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E171 Practice for Conditioning and Testing Flexible Barrier Packaging

E337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

3. Terminology

3.1 *Definitions:*

air conditioning—the simultaneous control of all, or at least the first three, of those factors affecting both the physical and chemical conditions of the atmosphere within any structure. These factors include temperature, humidity, motion, distribution, dust, bacteria, odor, and toxic gases.

air, dry—air containing no water vapor.

air, saturated—a mixture of dry air and water vapor in which the latter is at its maximum concentration for the prevailing temperature and pressure.

atmospheric pressure—the pressure due to the weight of the atmosphere. It is the pressure indicated by a barometer that registers actual atmospheric pressure which is not corrected to sea level equivalence. Standard atmospheric pressure is a pressure of 76 cm Hg (101325 Pa) having a density of 13.5951 g/cm^3, under standard gravity of 980.665 cm/s^2.

atmosphere, standard—air maintained at a specified temperature, relative humidity, and standard atmospheric pressure. **E171**

condition, standard—the condition reached by a specimen when it is in temperature and moisture equilibrium with a standard atmosphere.

conditioning—the exposure of a material to the influence of a prescribed atmosphere for a stipulated period of time or until a stipulated relation is reached between material and atmosphere.

dehumidify—to reduce, by any process, the quantity of water vapor within a given space.

dew point—the temperature to which water vapor must be reduced to obtain saturation vapor pressure, that is, 100 % relative humidity.

NOTE 1—As air is cooled, the amount of water vapor that it can hold decreases. If air is cooled sufficiently, the actual water vapor pressure becomes equal to the saturation water-vapor pressure, and any further cooling beyond this point will normally result in the condensation of moisture.

humidify—to increase, by any process, the quantity of water vapor within a given space.

humidistat—a regulatory device, activated by changes in humidity, used for the automatic control of relative humidity.

humidity—the condition of the atmosphere in respect to water vapor. (See also **humidity, absolute; humidity, relative.**)

humidity, absolute—the weight of water vapor present in a unit volume of air, for example, grains per cubic foot, or grams per cubic metre.

NOTE 2—The amount of water vapor is also reported in terms of weight per unit weight of dry air, for example, grains per pound of dry air. This value differs from values calculated on a volume basis and should not be referred to as absolute humidity. It is designated as **humidity ratio, specific humidity,** or **moisture content,** which also see.

humidity ratio—in a mixture of water vapor and air, the mass of water vapor per unit mass of dry air.

[1] This terminology is under the jurisdiction of ASTM Committee G03 on Weathering and Durabilityand is the direct responsibility of Subcommittee G03.92 on Terminology.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

humidity, relative—the ratio of the actual pressure of existing water vapor to the maximum possible (saturation) pressure of water vapor in the atmosphere at the same temperature, expressed as a percentage.

humidity, specific—in a mixture of water vapor and air, the mass of water vapor per unit mass of moist air.

moisture content—the moisture present in a material, as determined by definite prescribed methods, expressed as a percentage of the weight of the sample on either of the following bases:

(*1*) Original weight (Note 3).

(*2*) Moisture-free weight (Note 4).

NOTE 3—This is variously referred to as moisture content or moisture "as is" or "as received."

NOTE 4—This is also referred to as moisture regain (frequently contracted to "regain") or moisture content on the "oven-dry," "moisture-free," or "dry" basis.

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

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

NOTE 5—Moisture regain may result from either absorption or desorption, and differs from moisture content only in the basis used for calculation.

preconditioning—any preliminary exposure of a material to the influence of specified atmospheric conditions for the purpose of favorably approaching equilibrium with a prescribed atmosphere.

pressure, saturation—the pressure, for a pure substance at any given temperature, at which vapor and liquid, or vapor and solid, coexist in stable equilibrium.

pressure, vapor—the pressure exerted by a vapor.

NOTE 6—If a vapor is kept in confinement over its source so that the vapor can accumulate, the temperature being held constant, the vapor pressure approaches a fixed limit called the maximum, or saturated, vapor pressure, dependent only on the temperature and the liquid.

pressure, water vapor—the component of atmospheric pressure caused by the presence of water vapor, usually expressed in millimetres, inches of mercury, or pascals.

room temperature—a temperature in the range of 20 to 30°C (68 to 85°F).

NOTE 7—The term "room temperature" is usually applied to an atmosphere of unspecified relative humidity.

saturation—the condition of coexistence in stable equilibrium of a vapor and a liquid or a vapor and solid phase of the same substance at the same temperature.

saturation, degree of—the ratio of the weight of water vapor associated with a pound of dry air to the weight of water vapor associated with a pound of dry air saturated at the same temperature.

standard laboratory atmosphere—an atmosphere, the temperature and relative humidity of which is specified, with tolerances on each. **E171**

temperature—the thermal state of matter as measured on a definite scale.

temperature, dew point—see **dew point.**

temperature, dry-bulb—the temperature of the air as indicated by an accurate thermometer, corrected for radiation if significant.

temperature, wet-bulb—wet bulb temperature (without qualification) is the temperature indicated by a wet-bulb psychrometer constructed and used according to specifications. **E337**

vapor—the gaseous form of substances that are normally in the solid or liquid state, and that can be changed to these states either by increasing the pressure or decreasing the temperature.

4. Significance and Use

4.1 This terminology is not intended to supersede similar definitions in certain other existing documents, but is intended to provide a listing of terms that are in current widespread usage, and their context in relation to conditioning of test materials.

5. Keywords

5.1 atmosphere; conditioning; humidity; pressure; temperature