~~Designation:D 1776–04~~ Designation: D 1776 – 08

Standard Practice for Conditioning and Testing Textiles[1]

This standard is issued under the fixed designation D 1776; 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.

~~*This standard has been approved for use by agencies of the Department of Defense.*~~

1. Scope

1.1 This practice covers the conditioning and testing of textiles ~~in those instances where such~~ when conditioning is specified in a test method. Because prior exposure of textiles to high or low humidity may affect ~~the equilibrium~~ moisture pick-up equilibrium, a procedure also is given for preconditioning the material when ~~specified.~~required.

1.2 The values stated ~~in either SI units or inch-pound units~~ the text are ~~to be regarded separately as the standard. Within the text, the inch-pound~~ in SI units. Inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance ~~with the~~to a specification.

1.3 *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:*[2]

~~D123Terminology Relating to Textiles~~

~~D578Specification for Glass Fiber Strands~~

D 123 Terminology Relating to Textiles

D 618~~Practice for Conditioning Plastics and Electrical Insulating Materials for Testing~~ Practice for Conditioning Plastics for Testing

D 885 Test Methods for Tire Cords, Tire Cord Fabrics, and Industrial Filament Yarns ~~and Cords~~ Made from ~~Man-Made~~Manufactured Organic-Base Fibers

D 1776~~Practice for Conditioning Textiles for Testing~~

~~D4920Terminology Relating to Moisture in Textiles~~ Practice for Conditioning and Testing Textiles

D 4920 Terminology Relating to Conditioning, Chemical, and Thermal Properties

D 7269 Test Methods for Tensile Testing of Aramid Yarns

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

2.2 *ISO Standard:*

ISO 139 Textiles Standard Atmosphere for Conditioning and Testing[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *accelerated conditioning*, *n*— a process that uses humidity generation and precise temperature controls to rapidly bring a textile to equilibrium in a standard atmosphere.

3.1.1.1 *Discussion*—Accelerated conditioning may be achieved in closed cabinets, rooms or process lines designed such that equilibrium can be achieved in a much shorter time, such as 2 to 10 minutes, compared to typical conditioning times.

3.1.2 *moisture content*, *n*—that part of the total mass of a material that is absorbed or adsorbed water, expressed as a percentage of the total mass.

~~3.1.1.1~~

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[1] This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.51 on Conditioning and, Chemical and Thermal Properties.

~~Current edition approvedMarch 1, 2004. Published March 2004. Originally approved in 1998. Last previous edition approved in 1998 as D1776–98.~~

Current edition approved Aug. 1, 2008. Published October 2008. Originally approved in 1998. Last previous edition approved in 2004 as D 1776–04.

[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 tot he standard's Document summary page on the ASTM website.

[3] Available from American National Standards Institute, 11 W. 42nd Street, 13th Floor, New York, NY 10036.

3.1.2.1 *Discussion*—The total mass is the original mass comprising the dry substance plus any water present. The word *water* as used in these definitions refers to the compound chemically defined as H_2O. The terms *water* and *moisture* frequently are used interchangeably in the literature and the trade, but the term *moisture* is sometimes considered to include other volatile ~~material.~~matter.

~~3.1.2~~3.1.3 *moisture equilibrium*, *n*—~~the condition reached by~~ the state of condition a ~~material~~ textile reaches when it no longer takes up moisture from, or gives up moisture to, the surrounding atmosphere.

~~3.1.2.1~~3.1.3.1 *Discussion*—~~Superficial equilibrium with the film of air in contact with the textile material is reached very rapidly. Moisture equilibrium can be reached in a reasonable time only if the air to which the sample is exposed is in motion. Moisture equilibrium with the air in motion is considered to be realized when successive weighings do not show a progressive change in mass greater than the tolerance established for various textile materials.~~ —Superficial equilibrium is reached very rapidly when air comes into contact with the outer surfaces of a textile. Moisture equilibrium can be reached in a reasonable time only if the air to which the sample is exposed is in motion. Moisture equilibrium, with air temperature (in motion) and relative humidity controlled to prescribed levels, is achieved when successive weighings do not show a progressive change in mass greater than the tolerance established for the textile.

~~3.1.3~~*3.1.4 moisture equilibrium, for preconditioning*, *n*—~~the moisture condition reached by a sample or specimen after exposure to moving air in the standard atmosphere for preconditioning.~~

~~3.1.4~~—*the moisture state of a textile sample(s) or specimen(s) reached after exposure to moving air in the standard atmosphere for preconditioning.*

3.1.5 *moisture equilibrium, for testing*, *n*—~~the condition reached by a sample or specimen during free exposure to moving air controlled at specified conditions.~~

~~3.1.4.1~~— *the state of a textile sample(s) or specimen (s) reaches after exposure to moving air and relative humidity in selected standard atmospheres for conditioning and testing, when its mass does not change the after successive weighings.*

3.1.5.1 *Discussion*—For test purposes, moisture equilibrium must be reached by adsorption, starting from a relatively moisture content. Moisture equilibrium for testing is considered as having been reached when the rate of increase in mass of a sample or specimen does not exceed that specified for the material being tested.

~~3.1.5~~

3.1.6 *precondition*, *v*—to bring a sample or specimen of a textile to a relatively low moisture content (approximate equilibrium an atmosphere between 5 and 25% relative humidity) prior to conditioning in a controlled atmosphere for testing.

~~3.1.6~~

3.1.7 *standard atmosphere for preconditioning textiles*, *n*—a set of controlled conditions having a temperature not over 50°C (122°F), with respective tolerances of ±1°C (±2°F), and a relative humidity of 5-25% ± 2 % for the selected humidity that drying can be achieved prior to conditioning in the standard atmosphere for testing textiles.

~~3.1.7~~

3.1.8 *standard atmosphere for testing textiles*, *n*—laboratory conditions for testing fibers, yarns, and fabrics in which air temperature and relative humidity are maintained at specific levels with established tolerances. See Table 1.

~~3.1.7.1~~

3.1.8.1 *Discussion*—Textile materials are used in a number of specific end use application that frequently require different testing temperatures and relative humidities. Specific conditioning and testing of textiles for end product requirements can be carried out using Table 1 in Practice D 1776.

3.1.9 For additional terms, see Terminologies D 123 and D 4920.

4. Summary of Practice

4.1 Samples or specimens requiring preconditioning are brought to ~~a~~ relatively low moisture content in a specified atmosphere. Samples or ~~specimens~~ specimen not requiring pre-conditioning are brought to moisture equilibrium ~~for testing in~~ (specific to

TABLE 1 Standard Atmospheres for Testing Various Materials

Material	Temperature	Relative Humidity %	ASTM Standard
~~Textiles, general, other than nonwoven, tire cords and glass fiber~~	~~21 ± 1°C (70 ± 2°F)~~	~~65 ± 2~~	~~D 1776~~
Glass fiber products:			
~~Nonwovens (includes paper)~~	23 ± 1°C (73.4 ± 1.8°F)	~~50 ± 2~~	~~D 1776~~
~~Plastics and electrical insulating materials~~	23 ± 2°C (73.4 ± 3.6°F)	50 ± 5	D 618
~~Glass fiber products:~~			
Plastic applications	23 ± 2°C (73.4 ± 3.6°F)	50 ± 5	D 618
Plastic applications	23 ± 2°C (73.4 ± 3.6°F)	65 ± 5	D 1776
~~Textile applications~~	~~21 ± 1°C (70 ± 2°C)~~	~~65 ± 5~~	~~D 1776~~
Tire cords:			
~~Rayon~~	~~24 ± 2°C (75 ± 3.6°F)~~	~~55 ± 2~~	~~D 885~~
Rayon	24 ± 2°C (75 ± 3.6°F)	65 ± 2	D 885
~~Polyester,Aramid, Nylon~~	~~24 ± 2°C (75 ± 3.6°F)~~	~~55 ± 5~~	~~D 885~~
Aramid	24 ± 2°C (75 ± 3.6°F)	65 ± 5	D 7269