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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Heat Aging of Asbestos Textiles[1]

This standard is issued under the fixed designation D 1573; 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 test method covers the heat aging of asbestos textiles. It may be used to determine the resistance to the deterioration of tensile strength at temperatures up to 450°C (800°F).

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:*

D 123 Terminology Relating to Textile Materials[2]

D 1571 Specification for Woven Asbestos Cloth[3]

D 1682 Test Methods for Breaking Load and Elongation of Textile Fabrics[4]

D 2946 Terminology Relating to Asbestos[3]

3. Terminology

3.1 For textile terms, refer to Terminology D 123. For asbestos terms, refer to Terminology D 2946.

4. Significance and Use

4.1 This test method covers the evaluation of asbestos textiles with regard to (*1*) quality and (*2*) elevated temperature serviceability characteristics. Since asbestos textiles are usually composed of blends of asbestos with cotton or other organic carrier fibers, the latter being present in amounts up to 25 %, temperatures above 150°C (300°F) will promote the degradation of the cotton content and will reduce the structural reinforcement derived therefrom. In the higher grade asbestos textiles, wherein little or no carrier fibers are used and in which the longer asbestos fibers are necessary if a satisfactory yarn is to be produced, the degradation in strength resulting from heat-aging up to 540°C (1000°F) is low. In the case of the lower grade asbestos textiles, however, wherein amounts from 15 to 25 % carrier fibers are incorporated, asbestos fibers having shorter lengths may be utilized. Under the relatively low service temperatures to which such materials may be subjected, neither the cotton nor the cloth properties are greatly affected. However, the strength-imparting influence of the carrier fibers is reduced at elevated temperatures and the entwining properties of the shorter asbestos fibers primarily serve to establish the resultant tensile strength and other physical properties of the textile. In view of this, elevated temperature tests may serve to indicate the asbestos fiber grade or quality that may be used in a textile construction.

4.2 Another use and perhaps more practical application for the information to be derived from elevated temperature studies is the revelation of the ability of a subject textile to withstand known elevated temperature service conditions. It will be appreciated that temperature alone may not be the only degratory influence in the destruction of such materials; however, under normal operating conditions, high temperatures are usually the dominating factors in such degradation. The results obtained through such investigations therefore may be interpreted in terms of elevated temperature serviceability.

5. Apparatus

5.1 *Test Oven*:

5.1.1 The oven shall be electrically heated and have the necessary controls to maintain temperatures to within ±3°C (5.4°F) at any designated testing temperature up to 430°C (800°F) and shall have determinable and controllable air circulation. The air circulation provisions shall be capable of delivering between 3 and 6 m^3/min (100 and 200 ft^3/min) continuously to the oven during the testing period.

5.1.2 The minimum inside dimensions of the oven shall be 500 by 500 by 500 mm (18 by 18 by 18 in.), and it shall be provided with two hardware cloth trays, 20 mm (0.75 in.) mesh, at least 500 by 500 mm (18 by 18 in.), upon which the test specimens may be deployed.

5.2 The temperature indicating device shall be a chromela-lumel thermocouple, or its equivalent, coupled with an accurate potentiometer capable of being calibrated and adjusted to compensate for room temperature and cold junction differentials. Other devices ensuring at least equal precision and accuracy may be used.

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[1] This test method is under the jurisdiction of ASTM Committee C-17 on Fiber-Reinforced Cement Productsand is the direct responsibility of C17.03 on Asbestos–Cement Sheet Products and Accessories.

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[2] *Annual Book of ASTM Standards*, Vol 07.01.

[3] *Annual Book of ASTM Standards*, Vol 04.05.

[4] Discontinued. See *1981 Annual Book of ASTM Standards*, Vol 07.01.

6. Hazards

6.1 When cutting or handling asbestos textiles, avoid creating dust, or wear a respiratory protector. Frequent prolonged respiration of excessive airborne concentrations of asbestos may cause serious bodily harm.

7. Preparation of Apparatus

7.1 When starting a test, the oven temperature controls shall be set at the desired test temperature at the beginning of the heating-up period. The oven temperatures shall be determined by placing the junction of the thermocouple on a specimen of cloth supported on the upper hardware cloth tray, which will be located not less than 150 mm (6 in.) from the top of the oven nor less than 150 mm (6 in.) above the next lower tray.

7.2 Air circulation shall be maintained continually from the beginning of the heating period throughout the test cycle. The initial heating-up period, during which no test specimens shall be in the oven, shall be maintained for a minimum of 2 h or until such a time as the oven conditions have attained the degree of stability that will assure temperature variations no greater than prescribed in 5.1.1.

8. Procedure

8.1 *Time and Temperature for Test*:

8.1.1 All cloths shall be tested for a period of 2 h.

8.1.2 The temperature for testing shall be dependent upon the grade of the material under investigation, as follows:

Commercial Grade	204°C (400°F)
Underwriter's Grade	204°C (400°F)
Grade A	316°C (600°F)
Grade AA	316°C (600°F)
Grade AAA	427°C (800°F)
Grade AAAA	427°C (800°F)

8.1.2.1 Grades are defined in Specification D 1571.

8.2 *Deployment of Test Samples in Oven*—Following the attainment of stabilized conditions, specimens of the samples under test shall be individually positioned on the wire mesh trays. There shall be not less than 150 mm (6 in.) placed in the oven and not more than 150 mm (6 in.) between the top tray and the top of the oven or between the bottom tray and the bottom of the oven. With a hearth size 500 by 500 mm (18 by 18 in.) the individual trays will be 500 by 500 mm (18 by 18 in.) and on each may be positioned 12 individual grade test specimens. The placements shall be made as quickly as possible so that the oven door will remain open for a minimum length of time in order that the oven temperature may not drop markedly below the testing temperature in accordance with Test Methods D 1682.

8.3 Immediately upon closing the oven door begin the test period and continue the test for 2 h.

8.4 Upon completion of the test period, remove the specimens from the oven and permit them to condition at room temperature for 35 ± 5 min. Following this conditioning period, test the specimens for tensile strength. It is to be understood that tensile strength values (Note 1) and tensile strength retention values must be established on the basis of cloth constructions, as well as grade, and should be considered individually.

NOTE 1—The determination of actual strength values and the decision as to whether such values of tensile strength shall be in terms of kilograms (pounds) break resistance by the grab method or in terms of the percentage strength retention based on the grab test breaks are matters that can best be determined on the basis of the ultimate use to which such information is to be applied.

9. Report

9.1 Fully identify the samples tested.

9.2 Report the tensile strength values and tensile strength retention values in terms of breaking load in Newtons or pounds force and also in terms of the percentage strength retention based on the grab test breaks (Note 1).

10. Precision and Bias

10.1 *Precision*—The variance introduced into the eventual tensile test results obtained on specimens heat-treated by this test method is statistically insignificant compared against the inter-specimen variance and the variance due to the tensile test method.

10.2 *Bias*—Bias cannot be established on asbestos textiles for lack of a referee method.

11. Keywords

11.1 aging; asbestos; heat; heat-aging; tensile; textile