Designation: D 1445 – 95

An American National Standard

Standard Test Method for Breaking Strength and Elongation of Cotton Fibers (Flat Bundle Method)[1]

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INTRODUCTION

The flat bundle test for cotton fiber strength gained immediate acceptance after its introduction in 1953. The first successful instrument was an inclined plane device with the beam calibrated in pounds. The specimen was clamped with no space between the jaws and was called zero-gage strength. Results were expressed in Pressley Index (P.I.) calculated as the force-to-break in pounds divided by the bundle weight in mg. Obviously, P.I. is not a standard engineering unit.

Before the introduction of the flat bundle test, cotton fiber strength had been measured by the Chandler round bundle test (see former Method D 414) and the results expressed in pounds per square inch (psi). The U.S. Department of Agriculture obtained results from both instruments on specimens from the same samples of a large number of cottons. From this study, an empirical equation to express flat bundle test results in psi was

$$\text{Breaking strength, 1000 psi} = (10.81106 \times \text{P.I.}) - 0.12$$

When it was shown that a finite gauge length test was more highly correlated with yarn strength than tests made at zero gage length, the clamp design was modified to accommodate a ⅛ inch (3.2 mm) spacer. Selection of an engineering unit for reporting of results from ⅛ inch (3.2 mm) gauge tests presented a problem. However, the use of the tex for linear density and the introduction of a pendulum type instrument calibrated in kilograms led to the expression of results in grams-force per tex (gf/tex). The clamp width without spacer is 11.81 mm and with spacer is 15.00 mm. The bundle of fibers is mounted across the clamp width and trimmed to the width. The bundle mass is mg/11.81 mm or mg/15.00 mm.

The use of the flat bundle test in domestic and international commerce has had a long and successful history. Correcting this error in the empirical relationship would have serious adverse affects in the textile industry. Therefore, the empirical relationship is retained to calculate zero gage cotton fiber tensile strength designated as the Pressley strength in Eq 3 and 4 of D 1445.

1. Scope

1.1 This test method covers the determination of (*1*) the tensile strength or breaking tenacity of cotton fibers as a flat bundle using a nominal zero gage length, or (*2*) the tensile strength or breaking tenacity and the elongation at the breaking load of cotton fibers as a flat bundle with ⅛-in. (3.2-mm) clamp spacing. This test method is applicable to loose fibers of untreated cottons whether taken before processing or obtained from a textile product.

1.2 This test method is designed primarily for use with special fiber bundle clamps and special strength testing instruments but may be used with other tensile strength and elongation testing machines when equipped with appropriate adapters to accommodate the fiber clamps.

NOTE 1—Other methods for measuring the breaking tenacity of fiber bundles include Test Method D 1294, Test for Breaking Strength of Wool Fiber Bundles—1 in gage Length;[2] Test Methods D 4604, Measurement of Cotton Fibers by High Volume Instruments (HVI) (Motion Control Fiber Information System); Test Methods D 4605, Measurement of Cotton Fibers by High Volume Instruments (HVI) (Spinlab System of Zellweger Uster, Inc.).

1.3 The values stated in either acceptable metric units or in other units shall be regarded separately as standard. The values

[1] This method is under the jurisdiction of ASTM Committee D13 on Textiles, and is the direct responsibility of Subcommittee D13.11 on Cotton Fibers.

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

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