This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D1683/D1683M – 17

Standard Test Method for Failure in Sewn Seams of Woven Fabrics[1]

This standard is issued under the fixed designation D1683/D1683M; 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 U.S. Department of Defense.

INTRODUCTION

The structural integrity of textile products made of woven fabrics is dependent on how well the pieces that are cut from rolls of fabric have been joined together. To measure this integrity requires understanding the inter-relationship between two distinct test methods.

(a) The first evaluation is done by testing fabric using Test Method D5034. This standard is used to measure the resistance of a woven fabric to rupture in the warp direction and, the filling yarn direction. The test method measures the force needed to rupture the fabric causing the destruction of the fabric and the loss of its structural integrity. This loss of structural integrity causes yarn slippage, that is, the displacement and change of yarn spacing causing an irreversible fabric failure.

(b) Before completing the second evaluation, an analysis and determination of the anticipated failure mode needs to be completed by the fabric weaver or textile product manufacturer. While the failure mode for a woven fabric textile product sewn seam can demonstrate various and distinct levels, it is imperative to have agreement and understanding about the expected performance or service life of the end use product. Is the seam engineering used to build the textile product intended to perform for a "single incident" discarded and replaced, or is the end use product designed and engineered to be subjected to regular care and maintenance to include repairs?

(c) The second evaluation is done by using this test method, D1683/D1683M, to test fabric sections that have been cut and then sewn together using procedures that select a specific combination of sewing thread, stitch type, seam type, and stitch density. These are the seam engineering variables that determine which of the following outcomes can occur: *(1)* the fabric, at a force similar to that when tested using Test Method D5034, will rupture adjacent to the stitch line causing the destruction and loss of fabric integrity, and the failure of the textile structure; *(2)* the sewing thread used in the specific stitch configuration will rupture, at a force less than 85 % of the fabric break strength, such that the fabric integrity will be sufficient to enable repair of the textile structure along the same axis.

1. Scope

1.1 This test method measures the sewn seam strength in woven fabrics by applying a force perpendicular to the sewn seams.

1.1.1 The axis perpendicular to the sewn seam can represent either the warp yarn axis or filling yarn axis, the same axis tested when using grab Test Method D5034.

1.1.1.1 This test method is applicable to sewn seams obtained from a previously sewn article or seams sewn with fabric samples using one of two specific seam assemblies as shown in Table 1.

1.2 This test method is used when the maximum breaking force measurement to rupture of a woven fabric sewn seam is required.

1.2.1 This test method is used when the seam efficiency measurement of a woven fabric sewn seam is required.

1.2.2 This test method is used to identify the sewn seam strength threshold at which the failure of the stitching occurs, without damage to the fabric, so that the textile product can be repaired.

1.2.3 This test method is used to identify the force at which seam strength results in slippage and displacement of warp yarns, filling yarns, or any combination of these yarns.

1.3 This test method does not predict actual wear performance of a seam.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the*

[1] This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.54 on Subassemblies.

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