Designation: D 5822 – 02

# Standard Test Method for Determining Seam Strength in Inflatable Restraint Cushions[1]

This standard is issued under the fixed designation D 5822; 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 measurement of the maximum sewn seam strength which can be achieved in woven fabrics when a force is applied perpendicular to the seam. The grab test procedure in Test Method D 1683, which is used to measure breaking force and elongation in sewn seams of woven fabrics, shall be used in conjunction with this test method for measuring seam strength. For evaluating sewing thread, refer to Test Method D 204.

1.2 This test method is restricted to sewn seams that are obtained from a previously sewn driver or passenger side cushion.

1.3 This test method is used when a resistance to a force, a breaking force, a minimum elongation, or a combination thereof are required to determine the sewn seam strength, seam slippage, or seam integrity of a particular fabric for inflatable restraint use.

1.4 Procedures and apparatus other than those stated in this standard may be used by agreement between purchaser and supplier with the specific deviations from the standard acknowledged in the report.

1.5 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other.

1.6 *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 Textiles[2]

D 204 Test Methods for Sewing Threads[2]

D 1683 Test Method for Failure in Sewn Seams of Woven Fabrics[3]

D 6799 Terminology Relating to Inflatable Restraints[4]

## 3. Terminology

3.1 *Definitions:*

3.2 For definitions of other terms used in this standard, refer to Terminology D 123 and Terminology D 6799.

## 4. Summary of Test Method

4.1 Grab-type test specimens containing seams taken from inflatable restraint cushions at specified seam locations are destructively tested in a tensile testing machine under laboratory conditions to determine seam strength.

## 5. Significance and Use

5.1 In inflatable restraints, the method of creating a seam includes, but is not limited to, sweing, weaving, bonding and welding.

5.2 Seam strength testing is used for design validation and for lot acceptance.

5.3 This test method constitutes the conditions, procedures, and equipment by which inflatable restraints are tested for seam strength. It is intended to be used as a guideline in establishing a written part specification or print. The specification or agreement of purchaser and supplier may deviate from the procedures described herein when (based on experience) considerations of equipment, cushion design, or other factors dictate otherwise.

## 6. Apparatus

6.1 *Tensile Testing Machine*, either a constant-rate-of-extension (CRE) or a constant-rate-of-traverse (CRT) type, that is designed for the tensile forces anticipated, that is operated at a rate of 300 ± 10 mm/min (12 ± 0.5 in./min), that has a force range selected such that the anticipated break occurs between 10 % and 90 % of full scale load, and that has jaws and grip faces as agreed upon by purchaser and supplier.

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[1] This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.20 on Inflatable Restraints.

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

[3] Discontinued— See 1998 *Annual Book of ASTM Standards*, Vol 07.01.

[4] *Annual Book of ASTM Standards*, Vol 07.02.

6.2 For inflatable restraints, all test equipment used in accordance with this test method shall be certified for calibration annually by an independent agency or equipment manufacturer whose results are traceable to the National Institute of Science and Technology (NIST) or other national standards laboratory. The test parameters of the equipment shall be tested within the operating ranges covered in the cushion specification or equivalent document.

## 7. Sampling

7.1 Seam strength testing is a destructive test and therefore necessitates sampling procedures if used in conjunction with lot acceptance.

7.2 For acceptance testing, the lot size is the quantity of cushions sewn in one production day.

7.3 *Lot Sample*—For acceptance testing, take at random the number of cushions directed in an applicable cushion specification or other agreement between purchaser and supplier. Consider the cushions to be the primary sampling units.

7.4 *Seam*—Containing portions of sampled cushions constitute the test specimens.

7.5 Select specimens from cushions at locations on the cushion seam(s) where the greatest stresses are anticipated, as indicated in the cushion specification or equivalent. In seams involving woven fabric, this is usually where the warp or filling yarns are parallel to the seam. Cushion design may indicate other stress points of concern.

7.6 Unless otherwise specified for driver-side cushions, select specimens taken from the perimeter seam at the 0 rad (0°), 0.79 rad (45°), and 1.57 rad (90°) positions, relative to the warp direction of the fabric in the front panel.

7.7 For passenger-side cushions, select specimens from seam locations as directed in an applicable cushion specification or other agreement between purchaser and supplier.

NOTE 1—Avoid selecting specimens from areas of the cushion where the seams exhibit sharp radius turns. During seam strength testing, these areas will exhibit uneven point loading at the edges of the test specimen.

## 8. Conditioning

8.1 Conditioning of specimens for seam strength testing shall be at the standard atmosphere for testing textiles for at least 4 h prior to test.

## 9. Procedure

9.1 Select and condition specimens in accordance with Sections 8 and 7 of this test method.

9.2 Measure the seam strength of the specimens in accordance with Test Method D 1683.

9.3 On the test report, record the location from which the specimens were taken and the results of the seam strength tests for each location.

## 10. Report

10.1 State that the tests were conducted in accordance with Test Method D 5822 for determining the seam strength in inflatable restraints cushions.

10.1.1 If deviation from Test Method D 5822 occurred, any reference to this test method shall state: "Testing was performed in accordance with ASTM D 5822, with the following changes:"

10.2 The purchaser and supplier shall determine the exact form of the test report. Unless otherwise specified, the form shall provide the following information:

10.2.1 Cushion designation(s),

10.2.2 Lot identification,

10.2.3 Date of report,

10.2.4 Name of person certifying report,

10.2.5 Relevant specification,

10.2.6 Number of specimens used in each test and the cushion location of the specimens used in the seam strength test,

10.2.7 Tests performed and data obtained,

10.2.8 Laboratory conditions if other than standard, and

10.2.9 Deviations from standard procedures and apparatus.

## 11. Precision and Bias

11.1 A precision and bias statement is contained in Test Method D 1683. No additional statement is made about either the precision or bias of this test method for determining the seam strength of inflatable restraint cushions.

## 12. Keywords

12.1 airbag; cushion; inflatable restraint; seam strength