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Standard Test Methods for Determining Physical Properties of Inflatable Restraint Cushions¹

This standard is issued under the fixed designation D 5645; 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 These test methods cover the procedures used to evaluate the physical properties of driver-side and passenger-side inflatable restraint cushions.

1.2 The physical properties included by these test methods are seam strength, resistance to internal pressures greater than deployment pressures, and the leak rate of inflation gases at less than intended inflation pressures.

1.2.1 For ease of reference, the Summary of Test Method, Scope, Apparatus, Sampling, Procedure, and Precision and Bias sections are listed separately for each of the three physical properties of these test methods:

Property	Section
Seam Strength	9
Cushion Overpressurization	10
Leak Rate	11

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

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 are not exact equivalents; therefore, each system must be used independent of the other.

1.5 *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.* Specific precautionary statements are given in Section 6.

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textiles²

D 1683 Test Method for Failure in Sewn Seams of Woven Fabrics²

3. Terminology

3.1 Definitions:

3.1.1 *cushion, n—for inflatable restraints*, the inflatable fabric envelope portion of a module.

3.1.2 *cushion overpressurization, n—for inflatable re-*

straints, the process of overinflating a cushion at internal pressures greater than design deployment pressures; bag burst.

3.1.3 *deployment, n—for inflatable restraints*, the sequence of events related to the activation of a module.

3.1.4 *inflatable restraint, n—a vehicular safety device* designed to cushion an occupant or equipment during collision; airbag.

3.1.5 *inflator, n—for inflatable restraints*, a device for generating and directing expansion gases into a cushion.

3.1.6 *leak rate, n—for inflatable restraints*, the steady-state rate of flow of an inflation gas through the entire cushion surface area at less than intended deployment pressures.

3.1.7 *module, n—for inflatable restraints*, an assembly composed of an inflator, a cushion, a mounting device, a trigger, and a cover.

3.1.8 *standard atmosphere for testing textiles, n—an atmosphere for testing in which the air is maintained at a relative humidity of $65 \pm 2\%$ and at a temperature of $21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$).*

3.1.9 For definitions of other textile terms used in these test methods refer to Terminology D 123.

4. Significance and Use

4.1 Seam strength testing is used for design validation and in conjunction with lot acceptance.

4.2 Cushion overpressurization testing may be used in conjunction with design and production validation, manufacturing process control, lot acceptance, or a combination thereof.

4.2.1 Sources of variation in Cushion overpressurization testing procedures include orifice size, attachment fixture, method of attachment, presence or absence of internal bladder, accumulator size and pressure, transducer type and location, and presence or absence of vent plugs. All sources of setup variation should be addressed in the applicable part specification.

4.2.2 In accordance with the applicable specification, cushions may be pressurized without bursting to determine their resistance to a fixed level of high internal pressure, or they may be subjected to increasing pressures to determine their ultimate bursting strength.

4.3 Leak rate testing may be used in conjunction with design and production validation manufacturing process control, lot acceptance, or a combination thereof.

4.3.1 Leak rate testing is performed to detect large holes or cuts, skip stitches, open seams, or other abnormalities that might affect the flow rate of air through a cushion. Sources of variation in leak rate testing include orifice size, attachment fixture, method of attachment, accumulator size and pres-

¹ These test methods are under the jurisdiction of ASTM Committee D-13 on Textiles and are the direct responsibility of Subcommittee D13.20 on Inflatable Restraints.

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² Annual Book of ASTM Standards, Vol 07.01.