



## Designation: ~~D5427~~—~~09~~ D5427 – ~~09~~ (Reapproved 2014)

# Standard Practice for Accelerated Aging of Inflatable Restraint Fabrics<sup>1</sup>

This standard is issued under the fixed designation D5427; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice describes the procedures for the accelerated aging of inflatable restraint fabrics when required as a preparatory step for other test methods.

1.1.1 In Section 7, this practice lists four methods for conducting accelerated aging that are of concern to the design and manufacture of inflatable restraints. They are as follows:

Description	Section
Cycle aging (Option "A" or "B")	8.4
Heat aging (Option "A" or "B")	8.4.3.1
Humidity aging (Option "A" or "B")	8.7
Ozone aging	8.8

1.2 This practice may be used in conjunction with other ASTM test methods when subsequent tests of physical properties are required of aged fabric specimens.

1.3 Procedures and apparatus other than those stated in this practice may be used by agreement between the purchaser and the supplier with the specific deviations from the standard practice 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 independently 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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D123 Terminology Relating to Textiles](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

[D6799 Terminology Relating to Inflatable Restraints](#)

[E145 Specification for Gravity-Convection and Forced-Ventilation Ovens](#)

2.2 *Military Standard:*

[MIL-STD-810E Environmental Testing and Engineering Guidelines](#)<sup>3</sup>

## 3. Terminology

3.1 For all terminology relating to D13.20, Inflatable restraints, refer to Terminology [E145](#).

3.1.1 The following terms are relevant to this standard: accelerated ageing, environmental conditions, inflatable restraint, standard atmosphere for testing textiles

3.2 For all other terms related to textiles, see Terminology [D123](#).

## 4. Summary of Practice

4.1 After conditioning in the standard atmosphere for testing textiles, test specimens are subjected to accelerated aging for heat, humidity, ozone, or cycling.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee [D13](#) on Textiles and is the direct responsibility of Subcommittee [D13.20](#) on Inflatable Restraints. Current edition approved Jan. 15, 2009; July 1, 2014. Published February 2009; August 2014. Originally approved in 1993. Last previous edition approved in 2008; 2009 as [D5427—08](#); [D5427 – 09](#). DOI: [10.1520/D5427-09](#); [10.1520/D5427-09R14](#).

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](#), or contact ASTM Customer Service at [service@astm.org](#). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from the Defense Printing Office, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5093.

4.2 Aged specimens are then reconditioned in the standard atmosphere for testing textiles for subsequent testing of the physical properties of inflatable restraint fabrics.

## 5. Significance and Use

5.1 For inflatable restraints, practices for conducting accelerated aging are designed to determine the aggravated effects on a fabric from exposures to heat, humidity, or ozone, or a combination thereof. These environmental conditions may also be cycled in combination. The four accelerated aging procedures of concern to the design and manufacture of inflatable restraints are referred to as cycle aging, heat aging, humidity aging, and ozone aging.

5.2 The environmental conditions described in this practice are designed to allow restraints so that reliable comparisons may be made between different fabrics and different laboratories.

5.3 In order to achieve precise and reliable physical property comparisons of different fabrics, it is necessary to control accurately the humidity, temperature, ozone, and cycling conditions to which the fabric is subjected.

5.4 Fabric specimens are configured in accordance with the requirements of test methods to be conducted on the specimens subsequent to accelerated aging.

5.5 Unless otherwise specified by agreement between the purchaser and the supplier, this practice shall constitute the conditions, procedures, and equipment by which inflatable restraint fabrics are conditioned and aged. It is intended to be used as a guideline in establishing a written material specification. The specification or agreement of the purchaser and the supplier may deviate from the practices described herein when (based on experience) considerations of fabric properties, material handling equipment, or inflatable restraint system design dictate otherwise.

## 6. Apparatus

### 6.1 *Conditioning Room or Chambers:*

6.1.1 Room or chamber suitable for maintaining the standard atmosphere for testing textiles, with equipment for recording the temperature and humidity of the room.

6.1.2 For heat aging, a ventilated drying oven with a temperature range from 100 to 130 °C,  $\pm 2$  °C (212 to 266 °F,  $\pm 5$  °F) for 500 h, in accordance with Specification E145.

6.1.3 For humidity aging, a chamber suitable for maintaining a fixed relative humidity of 60 to 98 %, within a tolerance of  $\pm 5$  %, and a fixed temperature between 30 to 100 °C  $\pm 2$  °C (86 to 212 °F,  $\pm 5$  °F) for at least 500 h.

6.1.4 For ozone aging, a chamber suitable for maintaining the ozone concentration at  $100 \pm 10$  parts per hundred million (pphm), and suitable for maintaining a temperature at  $38 \pm 2$  °C ( $100 \pm 5$  °F).

6.1.5 For cycle aging, a chamber with controls for cycling through several temperatures from  $-40$  to  $107$  °C  $\pm 2$  °C ( $-40$  to  $225$  °F,  $\pm 5$  °F) and levels of relative humidity up to 95 %,  $\pm 5$  % for cycle times up to 72 h.

6.1.6 The aging chamber, the accessories contained therein, the sensors, and the data collection system shall be constructed and arranged in accordance with MIL-STD-810E, Method 507.3, Section II.

6.2 For inflatable restraints, all test equipment used in accordance with the procedures referenced in this practice shall be certified for calibration annually by an independent agency or equipment manufacturer whose results are traceable to 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 material specification or equivalent document.

## 7. Sampling

7.1 Rolls of fabric are sampled to yield test specimens in accordance with the sampling plan agreed upon by purchaser and supplier. The number of test specimens and their configuration shall conform to the requirements of the ASTM test methods associated with subsequent physical property testing.

## 8. Procedure

8.1 Condition fabric specimens in the standard atmosphere for testing textiles for 24 h and configure them in accordance with the test method that is to follow each accelerated aging procedure, or in accordance with alternate procedures established by agreement of purchaser and supplier and acknowledged in the test report.

8.2 Expose the specimens in accordance with the procedures given in 8.4 – 8.8, or in accordance with alternate procedures established by agreement between the purchaser and the supplier and acknowledged in the report.

8.2.1 If during placement of the specimens the environmental conditions within the chamber are no longer within prescribed limits, begin the timing of the aging process only when the chamber is once again stabilized within prescribed limits.

8.2.2 Ensure that the specimens are placed in the chamber in a configuration that permits free flow of air around them during the aging process.

8.2.3 The chamber temperature shall be controlled to within  $\pm 2$  °C ( $\pm 5$  °F) and the relative humidity shall be controlled to within  $\pm 5$  % RH.