



Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method¹

This standard is issued under the fixed designation D 6992; 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 accelerated testing for tensile creep, and tensile creep-rupture properties using the Stepped Isothermal Method (SIM).

1.2 The test method is focused on geosynthetic reinforcement materials such as yarns, ribs of geogrids, or narrow geotextile specimens.

1.3 The SIM tests are laterally unconfined tests based on time-temperature superposition procedures.

1.4 Tensile tests are to be completed before SIM tests and the results are used to determine the stress levels for subsequent SIM tests defined in terms of the percentage of Ultimate Tensile Strength (T_{ULT}). Additionally, the tensile test can be designed to provide estimates of the initial elastic strain distributions appropriate for the SIM results.

1.5 Ramp and Hold (R+H) tests may be completed in conjunction with SIM tests. They are designed to provide additional estimates of the initial elastic and initial rapid creep strain levels appropriate for the SIM results.

1.6 Values stated in SI units are to be regarded as standard. The common units given in parentheses are for information only.

1.7 This method can be used to establish the sustained load creep and creep-rupture characteristics of a geosynthetic. Results of this method are to be used to augment results of Test Method D 5262 and may not be used as the sole basis for determination of long term creep and creep-rupture behavior of geosynthetic material.

1.8 *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:²

D 2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

D 4439 Terminology for Geosynthetics

D 4595 Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

D 5262 Test Method for Evaluating the Unconfined Creep Behavior of Geosynthetics

3. Terminology

3.1 For definitions related to geosynthetics see Terminology D 4439.

3.2 For definitions related to creep see Test Methods D 2990 and D 5262.

3.3 Definitions of Terms Specific to This Standard:

3.3.1 *viscoelastic response*—refers to polymeric creep, strain, stress relaxation or a combination thereof.

3.3.2 *tensile creep*—time-dependent deformation that occurs when a specimen is subjected to a constant tensile load.

3.3.3 *tensile creep-rupture*—time dependent rupture that terminates a creep test at high stress levels.

3.3.4 *time-temperature superposition*—the practice of shifting viscoelastic response curves obtained at different temperatures along a horizontal log time axis so as to achieve a master curve covering an extended range of time.

3.3.5 *shift factor*—the displacement along the log time axis by which a section of the creep or creep modulus curve is moved to create the master curve at the reference temperature. Shift factors are denoted by the symbol AT when the displacements are generally to shorter times (attenuation) or the symbol AT when the displacements are generally to longer times (acceleration).

¹ This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.02 on Endurance Properties.

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² 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.

