



Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test¹

This standard is issued under the fixed designation D5397; 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 is used to develop test data from which the susceptibility of polyolefin geomembrane sheet material to stress cracking under a constant tensile load condition and an accelerated environmental condition can be evaluated.

1.2 This test method measures the failure time associated with a given test specimen at a specified tensile load level. Results from a series of such tests utilizing a range of load levels can be used to construct a stress-time plot on a log-log axis.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are provided for information only.

1.4 *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

D638 Test Method for Tensile Properties of Plastics

D883 Terminology Relating to Plastics

D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products(RECPs) for Testing

D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products

3. Terminology

3.1 Definitions:

3.1.1 *geomembrane, n*—very low permeability synthetic membrane liners or barriers used with any geotechnical engi-

neering related material so as to control fluid migration in a man-made project, structure, or system (see Test Method D4833).

3.1.2 *stress crack, n*—an external or internal crack in a plastic caused by tensile stresses less than its short-time mechanical strength (see Definitions D883).

3.1.2.1 *Discussion*—The development of such cracks is frequently accelerated by the environment to which the plastic is exposed. The stresses that cause cracking may be present internally or externally or may be combinations of these stresses.

4. Summary of Test Method

4.1 This test method consists of subjecting a dumbbell shaped notched test specimen from a polyolefin sheet to a constant tensile load in the presence of a surface-active agent and at an elevated temperature. The time to failure of the test specimen is recorded. The results of a series of such tests conducted at different stress levels are presented by plotting stress level against failure time for each stress level on a log-log axis.

5. Significance and Use

5.1 This test method does not purport to interpret the resulting response curve. Such interpretation is left to the parties involved in the commissioning and reporting of the test results.

5.2 This test method is intended as an index test and may be used for grading polyolefin geomembrane sheets in regard to their stress cracking sensitivity.

5.2.1 Conditions that can affect stress cracking include: level of loading, test temperature and environment, microstructure, polymer additive package, processing history, and thermal history.

6. Apparatus

6.1 *Blanking Die*—A die suitable for cutting test specimens to the dimensions and tolerances shown in Fig. 1.

NOTE 1—The length of the specimen can be changed to suit the design of the test apparatus. However, there should be a constant neck section with length at least 13 mm (0.5 in.) long. The width should be 3.20 mm (0.125 in.).

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.