

Australian Standard[®]

AS 3706.11—2012

Geotextiles—Methods of test

Method 11: Determination of durability— Resistance to degradation by light, heat and moisture

FOREWORD

This test method details the determination of durability of a geotextile with regard to degradation in tensile strengths caused by exposure to intense ultraviolet light and heat using a controlled xenon-arc light source. The method is an index test only; results may vary with different types and thicknesses of fabric. This Standard is based on ASTM D4355 *Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus*.

METHOD

1 SCOPE

This Standard sets out a method for determining the durability of geotextiles when subjected to degradation by artificial light and heat.

NOTES:

- 1 As the artificial light source produces heat, it is expedient to combine the tests for these two agencies of degradation.
- 2 If the product is subjected to prolonged high temperatures, a separate oven-ageing method may be more suitable for testing resistance to degradation due to heat.

2 APPLICATION

The method is applicable to all geotextiles.

NOTES:

- 1 The test does not give an absolute measure of the potential degradation of any particular geotextile. The correlation between this test and actual exposure is variable with different materials and conditions.
- 2 Further information on the correlation of testing and actual exposure may be found in 'Correlation of Laboratory to Natural Weathering' by George W. Glossman, *Journal of Coatings Technology*, Oct 1977 (vol. 49), no 633, pp 44–45.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

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|------------|--|
| 2001 | Methods of test for textiles |
| 2001.1 | Method 1.1: Conditioning procedures |
| 2001.2.3.1 | Method 2.3.1: Physical tests—Determination of maximum force and elongation at maximum force using the strip method |
| 2193 | Calibration and classification of force-measuring systems |
| 3704 | Geotextiles—Glossary of terms |
| 3706 | Geotextiles—Methods of test |
| 3706.1 | Method 1: General requirements, sampling, conditioning, basic physical properties and statistical analysis |

4 PRINCIPLE

Specimens are exposed under specified conditions to the light from a xenon-arc light source that is rich in ultraviolet light. The durability is assessed by comparing the maximum force and the elongation at maximum force of exposed specimens with that of unexposed specimens.

5 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 3704 apply.

6 APPARATUS

The following apparatus is required:

- (a) Constant-rate-of-extension (CRE) tensile testing machine complying with the requirements for a Grade B machine in accordance with AS 2193, and having an extension rate of 100 mm/min and an autographic recorder with adequate pen response or an interfaced computer to properly record the force/elongation curve.

For machines with no autographic recorder, appropriate measuring instruments shall be used to allow readings of the applied force and the corresponding elongation at a number of points up to failure.

- (b) Measuring and cutting equipment.
- (c) Xenon-arc weatherometer that complies with following:
 - (i) It shall allow for placement of specimens and designated sensing devices in positions that provide uniform irradiance by the light source. The irradiance at any position of the specimen area shall be at least 70% of the maximum irradiance measured in this area.
 NOTE: If all positions in the specimen area have an irradiance of at least 90% of the maximum, no specimen repositioning is necessary. If the lowest irradiance is between 70% and 90% of the maximum irradiance, the specimens will have to be periodically repositioned to ensure they receive an equal share of radiance.
 - (ii) It shall be capable of cycles of light only as well as light and moisture (e.g., water spray).
 - (iii) As xenon-arc lamps contain considerable quantities of ultraviolet radiation at wavelengths not present in terrestrial sunlight, appropriate filters shall be used to reduce the irradiance below 290 nm to less than 1% is required.

NOTE: It is recommended this be achieved by the use of a quartz inner filter in conjunction with a borosilicate outer filter.

- (d) The test apparatus shall be able to perform within the tolerances set out in Table 1.

TABLE 1
CYCLE CONDITIONS

	Light cycle	Light and moisture cycle
Automatic irradiance	0.35 W(m ² /nm) at 340 nm	0.35 W(m ² /nm) at 340 nm
Black panel temperature	65 ±2.5°C	—
Relative humidity	50 ±5%	—
Time of cycle	90 min	30 min

NOTE: Water spray to exposed face only.

7 PREPARATION OF TEST SPECIMENS

7.1 Sampling

A minimum of five specimens for each of the test conditions (unexposed and exposed) shall be sampled in accordance with AS 3706.1. For woven fabrics or other fabrics having anisotropic properties, a minimum of five specimens shall be cut for each of the test conditions requested and for both the machine direction and the cross-machine direction.

Each specimen shall be prepared as per the directions of AS 2001.2.3.1.

NOTES:

- 1 For woven fabrics, it is important that, after exposure, the samples tested contain the same number of threads in the longer dimension as prior to exposure.
- 2 Where possible, paired samples should contain the same threads in the larger dimensions for unexposed and exposed specimens.

7.2 Conditioning

The specimens shall be atmospheric-conditioned in accordance with AS 3706.1.

8 TEST CONDITIONS

The test atmosphere for tensile testing shall be in accordance with AS 2001.1.

9 PROCEDURE

9.1 Unexposed specimens

Unexposed specimens shall be tested in accordance with AS 2001.2.3.1.

9.2 Exposed specimens

The procedure shall be as follows:

- (a) Prepare the specimens to be exposed to fit the specimen holder being used.
- (b) Take five specimens (five cut in each direction, if applicable).
- (c) Mount the test specimens on the specimen carrier with the surface to be tested facing towards the lamp. Suspend the carrier and specimens on the inner surface of the sample rack so that the surfaces of the specimens under test are exposed to the light source.
- (d) Fill all unused slots with specimen holders filled with blanks to maintain desired air flow. Blanks shall be changed when noticeable physical distortion occurs.
- (e) Place the black-panel thermometer in a similar position to that of the specimen carrier.