

Australian Standard™

AS 3706.12

Geotextiles—Methods of test

Method 12: Determination of durability— Resistance to degradation by hydrocarbons or chemical reagents

1 SCOPE

The Standard sets out the method for determining the durability of geotextiles when subject to testing by hydrocarbons or chemical reagents.

2 APPLICATION

This method is applicable to all geotextiles.

3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

2193	Method of calibration and grading of force-measuring systems of testing machines
2508	Safe storage and handling information cards for hazardous materials
2508.3.009	Part 3.009: Hydrocarbon solvents
3704	Geotextiles—Glossary of terms
3706	Geotextiles—Methods of test
3706.1	Method 1: General requirements, sampling, conditioning and basic physical properties, and statistical analysis

4 PRINCIPLE

Specimens are exposed by immersion to hydrocarbons or chemical reagents under specific conditions. The durability is assessed by comparing the ultimate force and the elongation at ultimate 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:

- 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.

The machine should have 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 are required to allow readings of the applied force and the corresponding elongation at a number of points up to failure.

- (b) Bath, not affected by the specified reagent, maintained at a constant, specified temperature and of sufficient size to hold at least the central 100 mm length of each specimen.
- (c) Specified reagent sufficient to maintain the specified immersion of the specimens in the bath (see Clause 7).

7 REAGENTS

7.1 Hydrocarbons

Hydrocarbons include the following:

- (a) Diesel fuel
- (b) Kerosene
- (c) Petrol
- (d) Avgas
- (e) Crude oil.

Where no particular hydrocarbon is specified, the use of diesel fuel is recommended for comparative testing.

For safe storage and handling, see the appropriate Standard, such as AS 2508.3.009.

NOTE: Hydrocarbons and chemical reagents other than those listed may be used subject to agreement between the parties to the test

7.2 Chemical reagents

Chemical reagents include the following aqueous solutions:

- (a) Lactic acid having a concentration of 0.2 mol/l and pH 2.4 at $50 \pm 2^\circ\text{C}$.
- (b) Sodium carbonate having a concentration of 0.1 mol/l and pH of 11.6 at $50 \pm 2^\circ\text{C}$.
- (c) Calcium hydroxide having a concentration of 10 g/l and pH of 12.5 at $25 \pm 2^\circ\text{C}$ (a saturated solution with excess solids in suspension).
- (d) Sodium chloride (common salt) having a concentration of 30 g/l at $25 \pm 2^\circ\text{C}$.

8 PREPARATION OF TEST SPECIMENS

8.1 Sampling

A minimum of six 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 six specimens shall be cut for each of the test conditions and for both the machine direction and the cross-machine direction.

Each specimen shall be not less than 250 mm $\times$ 50 mm. Where applicable, woven materials shall be prepared as a ravelled strip, by cutting them wider and removing threads to reduce the width to 50 mm and to ensure that each specimen of a set has the same number of threads in the longer dimension.

8.2 Conditioning

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

9 TEST CONDITIONS

The test atmosphere shall be in accordance with AS 3706.1.

10 PROCEDURE

10.1 Unexposed specimens

The procedure shall be as follows:

- (a) Take six specimens (six cut in each direction, if applicable).
- (b) Set up the tensile testing machine as follows:
 - (i) Adjust the distance between the clamps to 200 ± 2 mm. Measure and record the gauge length.
 - (ii) Select the force range of the machine so that the break occurs between 10 percent and 90 percent of full-scale force.
 - (iii) Set the machine to an extension rate of 100 mm/min.
- (c) Insert the specimen centrally in the jaws with approximately equal lengths extending beyond the jaws at each end. Take care that the specimen length is parallel to the direction of application of force.
- (d) Start the testing machine and continue running the machine to rupture (i.e. break). For machines with no autographic recorder, record the applied force and corresponding elongation at a number of points up to failure.
- (e) If the specimen slips in the jaws, reject the result. (Jaw slippage may be detected by observing the movement between the jaw and trace of the original internal edge of the jaw, which has been marked with a chinagraph pencil, prior to loading). Test another specimen from the same roll, after adoption of one of the following procedures:
 - (i) Padding the face of the jaws, e.g. with felt, cork, cloth, or excess sample fabric.
 - (ii) Coating the specimen under the jaw face area.
 - (iii) Modifying the faces of the jaws.
 - (iv) Setting up two suitable steel rods of minimum length 75 mm, together with new specimens having their longer dimension in excess of 340 mm, in the testing machine as shown in Figure 1.
- (f) For each specimen, record as the ultimate tensile strength the maximum force indicated by the autographic recorder chart microprocessor printout or applied force readings. Where a number of peak forces are indicated, choose the maximum peak as the ultimate force.
- (g) Repeat Steps (c) to (f) until the required numbers of specimens have been tested.
NOTE: Further testing may be required in accordance with Steps (e) and (h) and Clause 11.3.
- (h) Reject the results in accordance with the following criteria, and test other specimens from the same roll:
 - (i) If for any reason attributed to faulty operation, a test result falls 20 percent or more below the average for the relevant six specimens tested.
 - (ii) If two or more of the six specimens tested break within 5 mm of the edge of a jaw.

For Item (ii), adopt one of the procedures detailed in Step (e) when testing another specimen.

NOTE: The decision to reject a test result is based on observation of the specimen during the test and upon the inherent variability of the fabric.