

Australian/New Zealand Standard®

Methods of testing underground marking tape

Method 2: Tear resistance

1 SCOPE This Standard sets out a method for determining tear resistance of underground marking tape.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

2103 Dial gauges and dial test indicators

2193 Methods for calibration and grading of force-measuring systems of testing machines

B83 Gauge blocks and their accessories

ASTM

D 1938 Test method for tear propagation resistance of plastic film and thin sheeting by a single-tear method

NZS

6507 Materials testing machines and force verification equipment

3 APPARATUS The following apparatus is required:

- (a) *Cutter*—a sharp razor blade or the equivalent.
- (b) *Micrometer*—a deadweight micrometer with a flat anvil of 6 mm diameter or larger in area and a 5 mm diameter flat surface on the head of the spindle. The total force applied by the spindle head shall be 1.2 ± 0.3 N. The micrometer gauge shall read to $2.0 \mu\text{m}$.

NOTE: The bench-type micrometer gauge normally used is only a comparator and should be regularly checked and calibrated in accordance with AS 2103, using slip gauges of Inspection Grade as specified in AS B83.

- (c) *Testing machine*—with a weighing head that can measure the load applied to tear the test specimen. It should be equipped with a device for recording the load carried by the test specimen and the amount of separation of the grips during the test. The testing machine shall be essentially free from inertia lag at the specified rate of testing and shall indicate the load with an accuracy of at least $\pm 2\%$ of the indicated value. The accuracy of the testing machine shall be verified in accordance with AS 2193 or NZS 6507 as appropriate. A device shall be included to control the grip separation rate at 300 mm/min to an accuracy of $\pm 5\%$.

* Based on ASTM D 1938.

4 PREPARATION OF TEST SPECIMENS The test specimens shall be of the single-tear type and shall consist of strips 75 mm long by 25 mm wide and shall have a clean longitudinal slit 50 ±1 mm long cut with a sharp razor blade (see Figure 1).

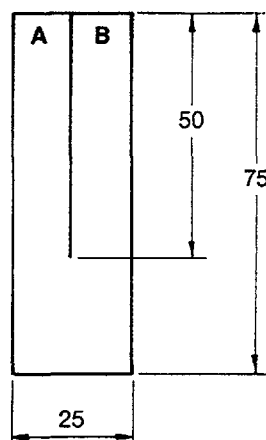
The thickness of the test specimen below the slit (see Figure 1) shall be measured in several places and recorded in μm to the nearest 2 μm .

Wherever possible, each test specimen shall be selected so that its thickness is uniform to within 5% over the length of the unslit portion.

Enough test specimens shall be cut to provide a minimum of five tear propagation force determinations each in the longitudinal and transverse directions of the material being tested.

5 PROCEDURE The procedure shall be as follows:

- (a) Secure tongue A (Figure 1) in one grip and tongue B in the other grip of the constant-rate-of-grip separation testing machine, using an initial grip separation of 50 mm. Align the test specimen so that its major axis coincides with an imaginary line joining the centres of the grips.



DIMENSIONS IN MILLIMETERS

FIGURE 1 SINGLE TEAR SPECIMEN

- (b) Using a grip separation speed of 300 mm/min, start the machine and record the load necessary to propagate the tear through the entire unslit 25 mm portion.
- (c) Test not less than five test specimens in each of the principal directions.

6 CALCULATIONS The following calculations shall be carried out:

- (a) For tapes that have load-time charts characterized by Figure 2, the average tear propagation force in newtons is obtained by averaging the load in kilograms indicated on the chart over the time period in seconds, disregarding the initial and final portions of the curve. This can be done with an integrator or a planimeter. In some cases, a fairly accurate estimate can be made by eye.
- (b) For tapes that have load-time charts characterized by Figure 3, the maximum force attained is determined from the chart and reported in newtons.
- (c) For each series of tests, all values obtained shall be determined to three significant figures.