

Australian/New Zealand Standard®

Methods of testing underground marking tape

Method 1: Elongation at break

1 SCOPE This Standard sets out a method for determining the elongation at break of underground marking tape*.

2 APPLICATION Elongation properties may vary with test specimen thickness, method of preparation, speed of testing, type of grips used, and manner of measuring extension. Consequently, where precise comparative results are desired, these factors must be carefully controlled. Materials that fail by tearing give anomalous data which cannot be compared with those from normal failure.

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

AS

2103 Dial gauges and dial test indicators

B83 Gauge blocks and their accessories

ASTM

D 882 Test methods for tensile properties of thin plastic sheeting

4 APPARATUS The following apparatus is required:

- (a) *Extension indicator* (if employed)—a suitable instrument for determining the distance between two fixed points located within the gauge length of the test specimen at any time during the test. It is desirable, but not essential, that this instrument automatically records this distance (or any change in it) as a function of the load on the test specimen or of the elapsed time from the start of the test, or both. If only the latter is obtained, load time data must also be taken. This instrument shall be essentially free of inertia lag at the specified speed of testing and shall be accurate to $\pm 1\%$ of strain or better.

In addition, such apparatus shall be designed so as to minimize stress on the test specimen at the contact points of the test specimen and the indicator.

- (b) *Grips*—a gripping system that minimizes both slippage and uneven stress distribution.

NOTE: Grips lined with thin rubber, crocusloth or pressure sensitive tape as well as file-faced or serrated grips have been successfully used for many materials. The choice of grip surface will depend on the material tested, thickness, and the like. In cases where samples frequently fail at the edge of the grips, it may be advantageous to increase slightly the radius of curvature of the edges where the grips come in contact with the test area of the test specimen. Air-actuated grips have been found advantageous, particularly with materials that tend to 'neck' into the grips, since pressure is maintained at all times.

* Based on ASTM D 882.

- (c) *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.

- (d) *Testing machine*—a testing machine of the constant rate-of-jaw separation type. The machine shall be equipped with a weighing system that moves a maximum distance of 2% of the test specimen extension within the range being measured. The machine shall be equipped with a device for recording the amount of separation of the grips with a measuring system accurate to $\pm 2\%$. The rate of separation of the jaws shall be uniform and capable of being adjusted to 500 mm/min.
- (e) *Test specimen cutter*—razor blades, fixtures incorporating razor blades, suitable paper cutters, or other devices capable of cutting the test specimens to the proper width and producing straight, clean, parallel edges with no visible imperfections. Devices that use razor blades have proved especially suitable for materials having an elongation-at-fracture in the range 10% to 20%. A device consisting of two parallel knives mounted firmly against a precision-ground base shear block (similar to a paper cutter) has also proved satisfactory. The use of striking dies is not recommended because of poor and inconsistent test specimen edges which may be produced. It is imperative that the cutting edges be kept sharp and free from visible scratches or nicks.
- (f) *Width measuring devices*—suitable test scales or other width measuring devices capable of measuring to within 0.25 mm.

5 PREPARATION OF TEST SPECIMENS The test specimen shall consist of strips of uniform width and thickness and shall have a length at least 50 mm longer than the 50 ± 0.5 mm initial grip separation (i.e. a minimum test specimen length of 100 mm). The nominal width of the test specimens shall be not less than 5.0 mm nor greater than 25.0 mm. A width-to-thickness ratio of at least 8:1 shall be used. The utmost care shall be exercised in cutting test specimens to prevent nicks and tears which are likely to cause premature failures. The edges shall be parallel to within 5% of the width over the length of the test specimen between the grips.

Wherever possible, test specimens shall be selected so that the thickness of each is uniform to within 10% of the thickness over the length of the specimen between the grips for tapes 0.25 mm or less in thickness, and to within 5% for tapes greater than 0.25 mm but less than 1.00 mm in thickness.

NOTE: Where thickness variations are in excess of those recommended above, results may not be characteristic of the material under test.

6 NUMBER OF TEST SPECIMENS Ten test specimens shall be tested from each sample of marking tape; five in the longitudinal direction and five in the transverse direction.

7 SPEED OF TESTING The speed of testing is the rate of separation of the two grips of the testing machine when running idle (under no load). This rate of separation shall be maintained within 5% of no-load value when running under full capacity load.

The speed of testing shall be set at 500 mm/min.