



Designation: ~~D2523–00~~ (Reapproved 2006) D2523 – 13

Standard Practice for Testing Load-Strain Properties of Roofing Membranes¹

This standard is issued under the fixed designation D2523; 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 practice is a guide for determining the load-strain properties of roofing membranes and their components at various temperatures. Test specimens may be prepared in the laboratory or cut from samples obtained in the field.

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

1.3 *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

[D95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation](#)

[D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension](#)

[E178 Practice for Dealing With Outlying Observations](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *roofing membrane*—that part of the roofing system whose primary function is to exclude water; it does not include field-applied aggregate.

4. Significance and Use

4.1 This practice is designed to aid those interested in the engineering properties of roofing membranes.

4.2 The data obtained will not permit prediction of the service life of a membrane under field conditions. The data will provide a basis for study of the mechanical properties of the membrane. Note that if strain rates, specimen dimensions, initial clear distance between clamps, or temperatures and moisture contents are varied, the data may not be strictly comparable.

5. Sampling

5.1 Take field membrane sample at least 100 by 250 mm (4 by 10 in.) in accordance with good roofing practices. In cases where field-applied aggregate is in place, remove it with a scraper such as a heated putty knife.

5.1.1 Sample those areas of the membrane that are expected to represent the extremes in load/strain characteristics.

5.1.2 At least one sample is required for each test temperature at which it is desired to determine load/strain properties.

5.2 Prepare laboratory samples at least ~~100~~200 by ~~250~~300 mm (~~4~~8 by ~~10~~12 in.) in strict accordance with the roofing specification being tested. Observe all cautions specified, such as not overheating the bitumen. Do not oven condition any of the components or the final sample.

5.2.1 Select those areas of the membrane that are expected to represent the extremes in load-strain characteristics. Prepare at least one sample of each type for each proposed test temperature. If there is any doubt about these areas, include all possible variations. The samples must be uniform in cross section.

¹ This practice is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.20 on Roofing Membrane Systems.

Current edition approved ~~May 1, 2006~~ June 15, 2013. Published ~~May 2006~~ July 2013. Originally approved in 1966. Last previous edition approved in ~~2000~~ 2006 as ~~D2523–00~~ D2523 – 00 (2006). DOI: ~~10.1520/D2523-00R06~~ 10.1520/D2523-13.

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.

5.2.2 Select materials at random when possible. Components should be conditioned at $50 \pm 5\%$ relative humidity and $25 \pm 2.5^\circ\text{C}$ ($77 \pm 4.5^\circ\text{F}$) for 24 h prior to constructing samples.

5.2.3 The quantity of material in any layer should be within $\pm 10\%$, and the entire sample should be within $\pm 5\%$ of the quantities specified.

6. Test Specimens

6.1 Condition the samples at room temperature at $50 \pm 5\%$ relative humidity for a minimum of 16 h for non-solvent-containing membranes, and until constant mass has been reached for solvent-containing membranes.

6.2 Die-cut three tension test specimens from each sample. The shape of the specimens for membranes with less than 50 % ultimate elongation is shown in Fig. 1. Where the membrane has an ultimate elongation greater than 50 %, use Die C of Test Methods D412.

6.3 At least three specimens must be tested at each selected temperature from each sample. If any sample is too small to permit the removal of three specimens, more than one sample of that type must be prepared or obtained in the field to yield the required three specimens.

7. Procedure

7.1 Condition each specimen at least 1 h at the selected test temperature.

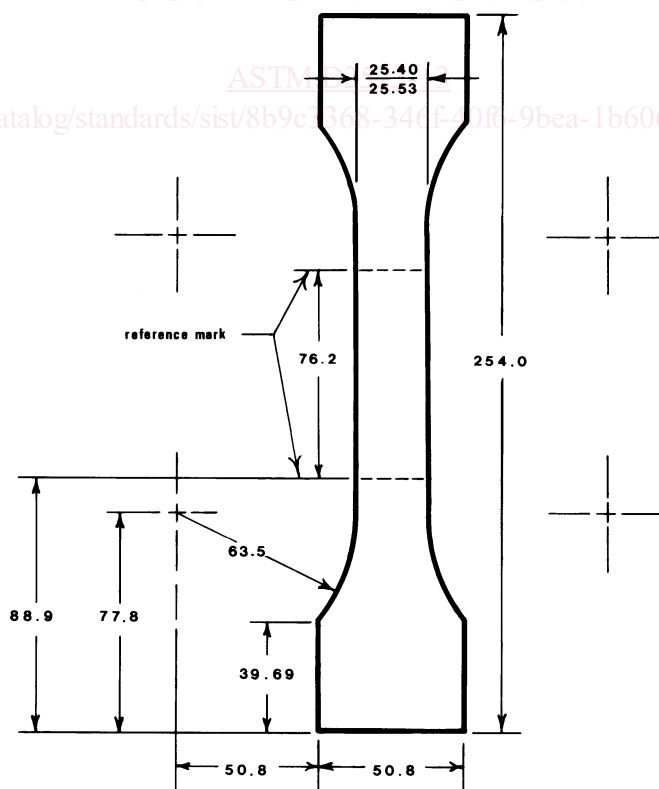
7.2 Control the following standard test temperatures to a tolerance of $\pm 2.5^\circ\text{C}$ (4.5°F): -18°C (0°F), 0°C (32°F), and 25°C (77°F). Recommended additional test temperatures, where appropriate, are: -34.4°C (-30°F), 50°C (122°F) and 70°C (158°F).

7.3 Use a tension testing machine, preferably with automatic load and strain recording equipment, and clamps that permit a uniform clamping pressure on the specimen without slipping. The clamps should be $178 \pm 5\text{ mm}$ ($7 \pm 0.2\text{ in.}$) apart at the start of the test.

7.4 Maintain a rate of elongation of $1.0 \pm 0.3\%$ /min for bituminous membranes or other materials having under 50 % ultimate elongation. This rate will be achieved if the jaws are separated at 1.3 mm/min (0.05 in./min).

7.5 Use a rate of elongation of 500 mm/min (20 in./min) for membranes whose ultimate elongation exceeds 50 %.

7.6 Measure the elongation of dumbbell specimens as the change in distance between reference marks on the constricted area of the specimen (see Fig. 1). Discard all specimens breaking outside the reference marks.



NOTE 1—All dimensions are in millimetres.

FIG. 1 Tension Test Specimen.