

Australian Standard™

Methods of testing flexible cellular polyurethane

Method 9: Determination of compression set

PREFACE

This Standard was prepared by the Standards Australia Committee PL/36, Flexible Polyurethane, under the direction of the Plastics Standards Board, to supersede AS 2282.9 — 1991.

This Standard is technically identical with ISO 1856:1980, *Polymeric materials, cellular flexible — Determination of compression set*.

METHOD

1 SCOPE AND FIELD OF APPLICATION This Standard specifies three methods for determining the compression set of flexible cellular materials.

At present, this Standard applies only to latex, and polyurethane foams of thickness greater than 2 mm. Methods for other materials will be added as required.

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

AS

2282 Methods of testing flexible cellular polyurethane

2282.1 Method 1: Sampling and conditioning of test specimens

2282.2 Method 2: Measurement of dimensions of test specimens

3 DEFINITION For the purpose of this Standard, the definition below applies.

3.1 Compression set—the difference between the initial thickness and the final thickness of a test piece of the cellular material after compression for a given time at a given temperature and after a given recovery time; this difference being referred to the initial thickness.

4 PRINCIPLE A test piece is maintained for a specified time at a specified temperature under constant deflection and the effect on the thickness of the released test piece is noted.

5 APPARATUS

5.1 Compression device Consisting of two flat plates having dimensions larger than those of the test pieces, with spacers and clamps such that the plates are held parallel to each other and the space between the plates is adjustable to the required deflected height.

For testing thin materials, a requisite number of square photographic glass mounting slides shall be provided. The thickness of the slides shall be between 1 and 1.5 mm and the length of side shall be between 50 and 55 mm.

5.2 Means of measuring the dimensions of test pieces Measurement of the dimensions of test pieces shall be in accordance with AS 2282.2.

6 TEST PIECES

6.1 Requirements Test pieces shall have parallel top and bottom surfaces and essentially vertical sides. They shall be 50 ± 1 mm long, 50 ± 1 mm wide and 25 ± 1 mm thick. All test pieces shall be free from contamination and skin on the vertical sides.

When thin materials are to be tested, sufficient test pieces, of dimensions 50 mm $\times$ 50 mm, shall be taken so that the sum of their thicknesses before compression is at least 25 mm. The test pieces shall be plied together and interleaved with the photographic mounting slides where the number of plies is greater than two, and the complete assembly shall be treated during the test as a single thick test piece.

6.2 Samples showing orientation If samples show orientation of the cellular structure, the direction in which the compression is to be carried out shall be agreed between the interested parties. Normally, testing should be carried out in that direction in which the finished product will be stressed under service conditions.

6.3 Number of test pieces Five 25 mm thick test pieces, or five assemblies in the case of thin materials, shall be tested.

6.4 Conditioning The test specimens shall be conditioned in accordance with AS 2282.1.

7 PROCEDURE

7.1 General The test may be carried out by either method A, method B or method C or all three. The three methods may, however, not give the same results.

7.2 Method A (compression at 70°C) After the test piece has been conditioned as specified in Clause 6.4, measure its initial thickness in accordance with AS 2282.2. In the case of thin materials, calculate the thickness of the foam (d_o) by deducting the aggregate thickness of the glass slides from the measured total thickness of the assembly of glass slides and test pieces measured with the assembly in the horizontal position.

Place the test piece or assembly between the plates of the compression device; compress it by either 50% or 75% of its thickness and maintain it under this condition. In special cases, a compression of 90% may be agreed upon.

Within 15 min, place the compressed test piece or assembly in an oven at $70 \pm 1^\circ\text{C}$ and leave it for 22 h.

Remove the apparatus from the oven and within 1 min remove the test piece from the apparatus and place it on a surface of low thermal conductivity, such as wood. The surface shall be at laboratory temperature. The test piece shall be allowed to recover for 30 min at the same temperature as that used for conditioning.

Remeasure its thickness (d_i). In the case of thin materials, care shall be taken not to disturb the assembly. Calculate the thickness (d_i) by deducting the aggregate thickness of the glass slides from the measured total thickness of the assembly of glass slides and test pieces.