

Australian Standard™

Methods for testing flexible cellular polyurethane

Method 10: Accelerated ageing tests

PREFACE

This Standard was prepared by the Standards Australia Committee PL/36, Flexible Polyurethane, to supersede AS 2282.10 — 1979.

During the preparation of this revision cognizance was taken of ISO 2440:1997, *Flexible and rigid cellular polymeric materials — Accelerated ageing tests*.

METHOD

1 SCOPE This Standard sets out laboratory methods that are intended to imitate the effects of naturally occurring reactions such as oxidation or hydrolysis by humidity. The physical properties of interest are measured before and after the application of the specified treatments.

2 APPLICATION The effect of the ageing procedures on any of the physical properties of the material may be examined, but those normally tested are either the elongation and tensile properties, or the compression or indentation hardness properties.

These tests do not necessarily correlate either with service behaviour or with ageing by exposure to light.

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

AS

2282 Methods for testing flexible cellular polyurethane

2282.1 Method 1: Sampling and conditioning of test specimens

2282.2 Method 2: Measurement of dimensions of test specimens

4 APPARATUS

4.1 For heat ageing Oven with forced circulation, capable of maintaining the required temperature to within $\pm 1^\circ\text{C}$.

NOTE: It is recommended that a device be used to record the temperature, preferably continuously.

4.2 For humidity ageing The following apparatus is required:

- (a) The ageing apparatus shall be of such a size that the total volume of test pieces does not exceed 10 percent of the free air space, and such that the test pieces are free of strain, freely exposed to the ageing atmosphere on all sides and not exposed to light.

- (b) Steam autoclave or similar vessel, capable of maintaining the required temperature to within $\pm 1^\circ\text{C}$ and of withstanding absolute pressures up to 300 kN/m^2 (3 bar).
- (c) Glass vessel, with a suitable closure, and a water bath or drying oven for heating the vessel, capable of maintaining the required temperature to within $\pm 1^\circ\text{C}$.

4.3 For physical property measurements Means of measuring the dimensions of the test piece in accordance with AS 2282.2.

5 TEST PIECES The number, size and shape of the test pieces shall be appropriate to the property being examined, and shall be prepared, before ageing, to the dimensions used in the particular test.

6 PROCEDURE

6.1 General After conditioning in accordance with AS 2282.1, the test of the required physical property shall be performed and the test pieces shall be brought rapidly to the ageing condition. If the test to be performed is destructive, for example the examination of tensile properties, it is recommended that the tests on both reference and aged material are performed at the same time, that is after the exposure of the latter to the ageing conditions.

The ageing conditions shall be chosen from the following alternatives, which should be appropriate to the material under test. It is recommended that materials differing in chemical composition should not be aged in the same enclosure.

6.2 Dry heat ageing The temperature for dry heat ageing shall be 125°C or 140°C with a tolerance of $\pm 1^\circ\text{C}$.

NOTE: The use of the non-standard temperature of 140°C is required for the following technical reason: the temperature of the ageing test should be as high as possible to enable results to be obtained in the minimum time, but above this critical temperature the changes that occur when polyurethane foam is tested are not those that are found in service, so that the ageing test will no longer discriminate between foams of different behaviour in service.

The duration of dry heat ageing shall be 16 h, 22 h, 72 h, 168 h, 240 h, or some multiple of 168 h, with a tolerance of ± 5 percent but not more than ± 4 h.

6.3 Humidity ageing The humidity for humidity ageing shall be 100 percent relative humidity or saturated steam.

The temperatures for humidity ageing and the duration of ageing are as follows:

<i>Material</i>	<i>Conditions</i>
Polyurethane (all types)	85°C for 20 h or 105°C for 3 h
Polyurethane (polyether only)	120°C for 5 h

The tolerance on temperature is $\pm 1^\circ\text{C}$.

The tolerance on duration of ageing is ± 5 percent but not more than ± 2 h, the time being measured from the time when the air in the vessel has been replaced by water vapour or steam.

NOTE: In this test for resistance to hydrolysis, the use of the non-standard temperatures of 105°C and 120°C is required for the following technical reasons: 105°C is used because this temperature requires the use of a closed vessel so that control of the conditions is better than at the alternative of 100°C ; 120°C is used because much experimental evidence has been accumulated at this temperature, but little or none at the alternative of 125°C . Until these background data are collected it is not considered possible to change to 125°C .