

Australian/New Zealand Standard™

Methods of testing wool packs for greasy wool

Method 5: Strength of fabric after exposure to ultraviolet radiation

AS/NZS 4547.5

1 SCOPE

This Standard specifies a procedure for determining loss in strength of wool pack fabric specimens after exposure to ultraviolet light at elevated temperatures.

2 REFERENCE DOCUMENTS

The following documents are referenced to in this Standard:

AS

2001 Methods of test for textiles

2001.1 Part 1: Conditioning procedures

AS/NZS

4546 Specification for woven wool packs for greasy wool

3 APPARATUS

3.1 Conditioning facility

A conditioning facility with a means of providing and maintaining a standard atmosphere as specified in AS 2001.1.

3.2 Lamp

A 500 W mercury vapour internally phosphor-coated, fluorescent lamp.

NOTE:

- 1 Phillips G74 500 watt MBTF 240-250V is an example of a suitable UV lamp.
- 2 New lamps should be operated for 100 hours before using them for test purposes. It is also recommended that they be discarded after 10000 hours of operation.

3.3 Unit assembly

The unit shall consist of a hollow cylinder of metal, or other suitable material, open at both ends, with an internal diameter of 370 mm and a minimum length of 300 mm. See Figure 1(b).

It shall be laterally supported by legs mounted on a base. The distance between the bottom of the cylinder and the base shall be approximately 100 mm to allow free access of air to all specimens. The appropriate lamp holder (see Figure 1(a)) shall be mounted on the base such that the lamp is central within the cylinder. An electric running hour meter shall be mounted on the base board as part of the lamp circuit.

If the apparatus is operated in low ambient temperatures it will be necessary to insulate the cylinder to maintain the specified black panel temperature (3.4).

NOTE: To control the upper limit of the specified temperature range it is recommended that a thermostatically controlled fan be installed above the lamp.

3.4 Black panel thermometer

A black panel thermometer consisting of a metal panel, at least 150 mm × 70 mm, the temperature of which is measured by means of a thermometer or thermocouple with its sensitive portion located in the centre and in contact with the panel. The side of the panel facing the light source shall be black, with an infra-red reflectance of less than 5 percent throughout the spectrum reaching the specimen. The side of the panel not facing the light source shall be thermally isolated.

NOTES:

- 1 If the lamp unit operates from mains voltage it may be susceptible to voltage fluctuations which have been shown to cause concomitant fluctuations of 10°C to 15°C in black panel temperatures. If such problems are encountered the use of a voltage stabilizer is recommended.
- 2 A suitable coating material for the black panel thermometer is gloss autoblack lacquer.

3.5 Specimen carrier

A suitable means of suspending the specimen on the inner surface of the hollow cylinder.

For example, 16 gauge aluminium sheet with two clamps attached for fully supporting the specimen at both ends and one for holding the carrier flush against the internal wall of the cylinder, see Figure 2. The positioning of the top specimen clamp, and the width of the carrier will be dependant on the required specimen size. The width of the specimen carrier should be equivalent to that of the specimen.

3.6 Lamp centring device

A device consisting of four arms of equal length at right angles to each other and containing a central pin to locate the lamp centrally within the cylinder. See Figure 1(a).

3.7 Tensile testing machine

A tensile testing machine of the constant rate of extension type with—

- (a) a rate of jaw separation of 100 mm per minute;
- (b) an autographic recorder giving a chart of force versus extension; and
- (c) upper clamps or jaws with a minimum width of 70 mm.

4 TESTING CONDITIONS

Testing conditions are as follows:

- (a) The fabric exposure to ultraviolet light shall be carried out under ambient conditions. The black panel temperature corresponding to the centre position of the test specimen inside the testing apparatus shall be $70 \pm 10^\circ\text{C}$.
The laboratory shall ensure these conditions are maintained during the period of exposure.
- (b) Following ultraviolet exposure, the specimens shall be conditioned in the standard atmosphere specified in AS 2001.1.

5 PREPARATION OF TEST SPECIMENS

The procedure shall be as follows:

- (a) Each of the specimens shall be representative of the sample and shall not include selvages.
- (b) Four specimens shall be cut in the warp direction and four in the weft direction. In the case of made up packs, two specimens shall be cut from each side of the pack, one in the warp direction and one in the weft direction.

- (c) Specimens shall be cut with their longitudinal dimensions parallel to the warp or weft of the fabric.
- (d) No two specimens shall contain the same longitudinal yarn and they shall be taken at least 100 mm from any edge or seam.
- (e) Specimens shall be cut approximately 200 mm by 60 mm.

6 TEST PROCEDURE

The procedure shall be as follows:

- (a) Mount the four warp and four weft specimens on individual holders, see Figure 2, free from wrinkles or folds in the area to be exposed. The surface of the specimens which represents the outer surface of the packs are to face the light source and shall be spaced around it at approximately equal interval as shown in Figure 1(c).
- (b) Count the number of yarns in a 50 mm width on the specimens.
- (c) Position specimen holders on the suspending frame at a distance of 180 mm from the centre of the light source as shown in Figure 1(c).
- (d) Expose the specimen to ultraviolet radiation for 168 hours using the conditions described in Clause 4(a).
- (e) After exposure, remove the specimens and fray the specimens down to the number of yarns counted in 6(b). Yarns shall be removed from each side of the specimens to achieve the required number.
- (f) Condition the exposed specimens in standard atmosphere as specified in AS 2001.1 for a minimum of two hours.
- (g) Carry out tensile testing in the standard atmosphere. Adjust the jaws of the tensile testing machine to a separation of 80 ± 1 mm. The jaws shall be aligned parallel to each other and perpendicular to the direction of the movement of the jaws.
- (h) Mount the specimen centrally in the width of the jaws.
- (i) Tension the specimen manually, then tighten the jaws fully. Ensure the pretension in the specimen is 20 ± 10 N prior to commencing testing. If the pretension is not within this range, then retension the specimen.
- (j) Extend the specimen to the point of rupture.
- (k) Record the maximum load in newtons applied in extending the specimen to rupture. This is the breaking load of the specimen.
- (l) Test all specimens following Items (f) to (k).

7 CALCULATION OF RESULTS

Calculation shall be as follows:

- (a) Calculate the arithmetic mean of breaking load for the exposed warp and weft specimens separately.
- (b) Calculate the absolute difference between the warp and weft specimens.

8 REPORT

The following shall be reported:

- (a) The mean breaking load in newtons of the exposed test specimens in the warp direction.