



## Knitted and woven shade fabrics



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The following are represented on Committee TX-008:

- Australian Industry Group
  - Australian Radiation Protection and Nuclear Safety Agency
  - AWTA Product Testing
  - CSIRO
  - Department of Health and Human Services Victoria
  - Engineers Australia
  - Specialised Textiles Association
  - University of New South Wales
- 

This Standard was issued in draft form for comment as DR AS 4174:2017.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Australian Standard<sup>®</sup>

## Knitted and woven shade fabrics

Originated as AS 4174—1994.  
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## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TX-008, Textiles for Horticulture and Agriculture, to supersede AS 4174—1994, *Synthetic shadecloth*.

*This Standard incorporates Amendment No. 1 (August 2019). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.*

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide requirements for the classification, performance and labelling of knitted and woven shade fabrics for horticultural and human protection uses.

Requirements for horticultural and human protection uses, are set out in separate sections of the Standard.

The following two aspects of this Standard were originally developed from a document for the supply of synthetic shade fabric initiated by the Australian shade fabric industry in 1985:

- (a) Measurement of the cover factor of a shade fabric using a standard instrument.
- (b) Cover factor ranges for different categories of shade fabric.

The terms ‘normative’ and ‘informative’ have been used to define the application of the appendices to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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## FOREWORD

When shade fabric is to be used for human protection purposes, such as shade structures, the calculated UVE results do not take into account important factors that may decrease the effective UVE, such as design features, height and size of the shade structure, the distance of the shade fabric from the subjects, the effect of direct and indirect solar UVR and the physical location of the subjects within the shade structure.

For this reason, the UVE value determined for the classification of the fabric does not indicate the actual reduction of solar radiation by a structure incorporating that fabric. A warning statement to this effect has been specified for inclusion on the labelling of fabric to be used for human protection purposes.

Evaluation by ultraviolet protection factor (UPF), in accordance with AS/NZS 4399, *Sun protection clothing—Evaluation and classification*, is not appropriate for evaluating shade fabrics for horticultural use or human protection.

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## STANDARDS AUSTRALIA

**Australian Standard**  
**Knitted and woven shade fabrics**

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE**

This Standard specifies requirements for the classification, performance and labelling of knitted and woven shade fabrics for horticultural and human protection applications.

Requirements include the following:

- (a) Measurement of the cover factor of a shade fabric using a standard instrument. (For horticultural applications.)
- (b) Cover factor ranges for different categories of shade fabric. (For horticultural applications.)
- (c) Minimum strength requirements for shade fabric both before and after a set period of exposure to light.
- (d) A method for the determination of transmittance of ultraviolet and visible radiation.
- (e) A method for the measurement and calculation of ultraviolet effectiveness (UVE). (For human protection applications.)
- (f) Methods for the calculation of the average percentage transmittance, the shade factor, the average percentage UVR transmittance, the percentage UVR block and the average percentage PAR transmittance. (For horticultural applications.)
- (g) A method for the determination of resistance to degradation by light in Appendix C.
- (h) Determination of mass per unit area.
- (i) Determination of solar radiation transmittance.
- (j) Determination of flammability properties.
- (k) Labelling requirements.

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## NOTES:

- 1 Guidelines to assist in designing shade structures can be found in Appendix F.
- 2 Manufacturers making a statement of conformance to this Standard on a product, or on packaging or promotional material, are advised to ensure that such conformance is capable of being verified.

**1.2 APPLICATION**

This Standard specifies performance requirements for shade fabric, for horticultural and human protection uses.

For horticultural shade fabric, the requirements of Section 2 apply.

For human shade protection fabric, the requirements of Section 3 apply.

### 1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

#### AS

|            |                                                                                                                                                                               |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2001       | Methods of test for textiles                                                                                                                                                  |
| 2001.2.3.1 | Method 2.3.1: Physical tests—Determination of maximum force and elongation at maximum force using the strip method                                                            |
| 2001.2.13  | Method 2.13: Physical tests—Determination of mass per unit area and mass per unit length of fabrics                                                                           |
| 2001.2.19  | Method 2.19: Physical tests—Determination of bursting force of textile fabrics—Ball burst method                                                                              |
| 2001.4.21  | Method 4.21: Colourfastness tests—Determination of colourfastness to light using artificial light source (mercury vapour, tungsten filament, internally phosphor-coated lamp) |
| 2001.4.A02 | Method 4.A02: Colourfastness tests—Grey scale for assessing change in colour                                                                                                  |

#### AS/NZS

|        |                                                                                                       |
|--------|-------------------------------------------------------------------------------------------------------|
| 1530   | Methods for fire tests on building materials, components and structures                               |
| 1530.3 | Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release |

#### ISO

|        |                                                                                                  |
|--------|--------------------------------------------------------------------------------------------------|
| 9845   | Solar energy—Reference solar spectral irradiance at the ground at different receiving conditions |
| 9845-1 | Part 1: Direct normal and hemispherical solar radiance for air mass 1,5                          |

### 1.4 DEFINITIONS

For the purposes of this Standard, the definitions below apply:

#### 1.4.1 Cover factor

The UV radiation (350 nm) transmitted through a specimen of shade fabric determined in accordance with Appendix A.

#### 1.4.2 Direct UVR

Solar ultraviolet radiation that reaches the earth's surface in a straight line from the direction of the sun in the sky.

#### 1.4.3 Indirect UVR

Solar radiation that has been scattered by molecules and particles in the atmosphere and still reaches the surface of the earth.

#### 1.4.4 PAR

Photosynthetically active radiation in the range 400 nm to 700 nm.

#### 1.4.5 Protection category

The level of protection afforded by the shade fabric in non-numerical terms as a guide for purchasers of the product.

#### 1.4.6 Shade fabric

A fabric designed to prevent a proportion of sunlight or other light from reaching the area beyond the shade fabric.

#### **1.4.7 Shade factor**

The percentage of normally incident UV-visible radiation in the range 290 nm to 770 nm not transmitted by a material, determined in accordance with Appendix B.

#### **1.4.8 Ultraviolet effectiveness (UVE)**

A measure of the ability of a fabric to block ultraviolet radiation. UVE is calculated from the ratio of the photo-biologically effective ultraviolet radiation irradiance transmitted through air to the photo-biologically effective ultraviolet radiation irradiance transmitted through the shade fabric which is determined in accordance with Appendix D for each sample and then averaged for the number of specimens analysed and is expressed as a percentage.

#### **1.4.9 UVR**

Solar ultraviolet radiation in the range 290 nm to 400 nm.

## SECTION 2     HORTICULTURAL SHADE PROTECTION FABRICS

### 2.1 GENERAL

Horticultural shade protection fabrics are those designed primarily for agricultural use. The performance classifications for knitted and woven shade protection fabrics shall be as determined in Clause 2.2.

### 2.2 PERFORMANCE REQUIREMENTS

#### 2.2.1 Cover factor

The cover factor of the shade fabric shall be determined in accordance with Appendix A. The cover factor range shall be used to determine the designation of the shade fabric and the colour code as set out in Table 2.1.

**TABLE 2.1**  
**DESIGNATION AND COLOUR CODE ACCORDING TO**  
**COVER FACTOR RANGE FOR HORTICULTURAL APPLICATION**

| Type of shade fabric | Designation of shade fabric | Cover factor range % | Colour code   |
|----------------------|-----------------------------|----------------------|---------------|
| Knitted or woven     | Ultra-light cover           | 10 to 25             | Black         |
|                      | Extra-light cover           | 26 to 49             | Dark green    |
|                      | Light cover                 | 50 to 63             | Red or orange |
|                      | Medium cover                | 64 to 73             | Blue          |
|                      | Heavy cover                 | 74 to 83             | White         |
|                      | Extra-heavy cover           | 84 to 93             | Lime green    |
|                      | Ultra-heavy cover           | 94+                  | Beige         |

#### 2.2.2 Strength

##### 2.2.2.1 Knitted shade fabrics

- A1 | Knitted fabrics shall be tested in accordance with AS 2001.2.19 in a dry condition. The mean bursting force shall be used to designate the shade fabric in accordance with Table 2.2.