

Australian Standard®

Methods of test for textiles

Method 4.1: Colourfastness tests—Definitions and general requirements

PREFACE

This Standard was prepared by the Standards Australia Committee on Testing of Textiles as one of a series for determining the colourfastness of textiles. It supersedes AS 2001.4.1—1980.

This series of methods is largely based on the work of a technical committee of the International Standards Organization for Standardization (ISO/TC 38/SC 1) and is being adapted to suit Australian conditions.

Methods of test for determining the colourfastness of textiles to various treatments embody a number of common features. It is therefore convenient to group and present features including definitions, reagents, apparatus, samples, test specimens, procedures and other information in this Standard, which constitutes a basic reference for all colourfastness tests.

This edition of this Standard introduces the use of multifibre undyed cloths, but requires the use of the conventional undyed cloths of single fibre construction for referee assessments.

It also introduces the use of instrumental assessment techniques for evaluating colour change and staining.

METHOD

1 SCOPE This Standard sets out a basic reference for methods of test for determining the colourfastness of textiles to various treatments. It includes information in respect to definitions, reagents, apparatus, samples, test specimens and procedures common to many textile test methods.

2 OBJECTIVE This Standard is intended to provide manufacturers and others seeking to determine the colourfastness of textiles to various treatments such as chemical, mechanical or naturally occurring treatments (e.g. sunlight), with a suitable method for obtaining that information.

3 REFERENCED DOCUMENTS The following documents are referred to in this Standard.

AS	
1199	Sampling procedures and tables for inspection by attributes
2001	Methods of test for textiles
2001.1	Conditioning procedures
2001.4	Colourfastness
2001.4.15	Determination of colourfastness to washing

ISO

105 Textiles—Tests for colour fastness

Part A02: Grey Scales for assessing change in colour

Part A03: Grey Scales for assessing staining

Part A04: Method for the instrumental assessment of the degree of staining of adjacent fabric

Part A05: Method for the instrumental assessment of the change in colour of a test specimen

Part B01: Colour fastness to light—Daylight

Part F Standard adjacent fabrics

Part F01: Specification for standard adjacent fabric: Wool

Part F02: Specification for standard adjacent fabric: Cotton and viscose

Part F03: Specification for standard adjacent fabric: Polyamide

Part F04: Specification for standard adjacent fabric: Polyester

Part F05: Specification for standard adjacent fabric: Acrylic

Part F06: Specification for standard adjacent fabric: Silk

Part F07: Specification for standard adjacent fabric: Secondary acetate

Part F08: Specification for standard adjacent fabric: Triacetate

Part F09: Specification for standard rubbing cloth: Cotton

Part F10: Specification for adjacent fabric: Multifibre

Part J03: Calculation of colour differences

4 DEFINITIONS For the purpose of this Standard, the definitions below apply.**4.1 Blank test**—a test to a treatment using undyed cloths, omitting the test specimen.**4.2 Colourfastness**—the resistance of textiles to colour change, and staining of undyed cloths, where applicable, to various treatments. Ratings are assigned to the change in colour of the test specimen and to the amount of staining of undyed cloth(s), as appropriate.**4.3 Composite specimen**—the test specimen attached to one or two of the undyed cloths.**4.4 Test specimen**—the representative piece of the textile, usually taken from the sample, to be tested. If multicoloured textiles are to be tested, a sufficient number of test specimens are taken to ensure that all the colours are represented. Where possible, individual ratings are assigned to each colour.**4.5 Undyed cloths**—cloths (adjacent fabrics) described in Appendix A, as required by this Standard for assessing staining.**5 PRINCIPLE** A test specimen of the textile, commonly in contact with undyed cloth(s) is exposed to a treatment that may affect the colour of the textile or cause staining of undyed cloth(s). The resultant change in colour of the test specimen and staining of undyed cloth(s) are assessed as appropriate.**6 REAGENTS****6.1 Chemicals** Chemicals shall be of analytical reagent quality unless otherwise specified.**6.2 Water** Distilled or deionized water shall be used in the preparation of test solutions. Water of hardness greater than 100 mg/L of CaCO₃ shall not be used.**7 APPARATUS****7.1 Conditioning facility** Means of providing and maintaining a standard atmosphere as described in AS 2001.1, if required (see Clause 9.3).

7.2 Grey Scales for assessing change in colour The scale complying with ISO 105 Part A02, as described in Appendix A, for determining the change in colour of test specimens in colourfastness tests.

7.3 Grey Scales for assessing staining The scale complying with ISO 105 Part A03, as described in Appendix A, for determining staining of undyed cloth(s) in colourfastness tests.

7.4 Mask (as required) A flat mask made from any suitable opaque, non-reflective, black material. The mask shall be of sufficient size to cover the areas of original textile, test specimen, blank test and tested undyed cloth(s) and Grey Scales, as appropriate, and shall provide similar viewing dimensions of test specimens, test undyed cloth(s) and Grey Scales.

NOTE: Assessments of change in colour of a test specimen and staining of undyed cloth(s) are conducted by comparing viewed areas of similar dimensions to those of the Grey Scale with a tested and original specimen and as appropriate (see Clauses 9.4.2(a) and 9.4.3(a)). Adjustment of these dimensions may be made by cutting or masking.

7.5 Blue wool standards for assessing colourfastness to light The wool cloth standards 1 to 8 conforming to ISO 105 Part B01, as described in Appendix A.

7.6 Undyed cloths Cloths (adjacent fabrics) used for assessing staining shall be as described in Appendix A. Undyed cloths shall be selected thus:

- (a) According to the directions in the relevant material specification.
- (b) According to either of the following guidelines if directions are not included in the material specification:
 - (i) A multifibre adjacent fabric, complying with ISO 105-F10 as specified in Table A1 of Appendix A.
 - (ii) Two single fibre adjacent fabrics complying with the relevant sections of F01 to F08 of ISO 105 with one piece being made of the same fibre type as that of the textile to be tested (or that predominating in the case of blends) and the second piece made of the fibre as indicated in Table 1 or, in the case of blends, of the fibre type second in order of predominance or as otherwise specified.

TABLE 1
SINGLE FIBRE ADJACENT FABRICS

If first piece is:	Second piece to be:
Cotton	Wool or nylon
Wool	Cotton
Silk	Cotton
Linen	Cotton
Viscose	Wool or nylon
Acetate	Viscose
Polyamide	Wool or Viscose
Polyester	Wool or cotton
Acrylic	Wool or cotton

NOTE: If required, a non-dyeable fabric (e.g. polypropylene) may be used.

7.7 Sewing yarn The sewing yarn used to form composite specimens shall be undyed and free of fluorescent brightening agents.

7.8 Drying cabinet (optional) The temperature of the drying cabinet shall not exceed 60°C.

7.9 Viewing cabinet The viewing cabinet shall provide a source of colour corrected light of minimum colour temperature 6500 K with a luminous flux not less than 600 lx to the viewing surface of a stand on which test specimens and undyed cloths are placed for assessment. Light shall be incident to the viewing surface at an angle of approximately 45° and viewing shall be in a plane approximately perpendicular to the surface. The surrounding field shall be of non-reflective grey colouration between the chips illustrating Grades 1 and 2 of the Grey Scale for assessing change in colour (see Appendix A).

7.10 Spectrophotometer or colorimeter The spectrophotometer or colorimeter shall be as specified in ISO 105 A04 or A05 respectively.

8 SAMPLE AND TEST SPECIMENS

8.1 Sample selection

8.1.1 Lot sampling A lot sample shall be selected in accordance with the relevant material specification.

Where there is no material specification, the sample shall be selected using a sampling plan determined in accordance with AS 1199.

NOTE: To provide a sampling plan with a meaningful producer's risk and consumer's risk, an adequate specification needs to take into account the variability between rolls of fabric, and between specimens from a sample taken from a roll of fabric.

8.1.2 Laboratory sample A laboratory sample shall be either—

- (a) taken from a lot sample which is representative of the bulk; or
- (b) a sample which has been submitted for testing, and which may or may not be representative of the bulk.

8.2 Preparation of a composite specimen The following methods for preparation of a composite specimen are commonly employed:

- (a) *Fabric* For fabric, place a fabric specimen between two undyed cloths of the same size, and sew along either one side or around all four sides, as required by the particular method.

NOTE: It may be necessary to prepare and test more than one composite specimen if the fabric surface(s) have variation in either colour, fibre, composition or finish.

- (b) *Yarn* For yarn, either knit a specimen into fabric, and treat as in Item (a) above, or place a layer of parallel lengths of the yarn specimen between two undyed cloths of the same size and sew along either one side or around all four sides, as required by the particular method.
- (c) *Fibre* For fibre, comb and compress a specimen of the fibre to form a sheet having approximately half the total mass of two undyed cloths each of the same size. Place the sheet of fibre between the two undyed cloths, and sew around all four sides.

9 PROCEDURES

9.1 Rinsing of composite specimens Composite test specimens are normally rinsed in cold, running, filtered tap water for 2 min.

9.2 Drying of composite specimens Composite test specimens are normally dried as follows:

- (a) *For yarn or fabric* Remove all but one seam of the composite specimen and hang in such a way that the undyed cloths fall free and away from the test specimen except at the remaining seam, and dry in air not exceeding 60°C.

- (b) *For fibre* Separate the test specimen and undyed cloths, and dry apart in air not exceeding 60°C.

9.3 Cooling or conditioning Allow the test specimen and undyed cloths to return to equilibrium with ambient conditions before assessment. Where differences in temperature or moisture content of the test specimens or undyed cloths will influence the results, the assessment shall be made after 4 h under standard conditions as prescribed in AS 2001.1.

9.4 Assessment of colourfastness

9.4.1 General For multicoloured specimens, the colour with the greatest amount of colour change or staining shall be assessed and reported, providing the area of that colour is adequate to allow a fair comparison with an untreated area of the same colour.

For some multicoloured specimens where many small coloured areas are blended into the overall shade which may not allow individual testing and assessment, the shade depth or pattern repeat of the individual colour may be a major factor in the overall assessment of the colourfastness of the specimen. When this type of specimen is tested, the overall appearance is to be assessed and reported.

9.4.2 Visual assessment of change in colour of a test specimen Change in colour for each test specimen shall be assessed as follows:

- (a) Place a specimen of the original textile and the test specimen adjacent to each other in the same plane and oriented in the same direction (e.g. with respect to pattern or yarn direction) in the viewing cabinet (see Clause 7.9). If necessary, two or more layers of the original textile and tested specimen shall be used to ensure opacity. Either cut or place a mask (see Clause 7.4) over the original textile and the test specimen so that the viewed dimensions of each are similar to those of the Grey Scale chips.
- (b) Place the Grey Scale for assessing change in colour in the same plane and immediately above or below the original textile and the test specimen.
- (c) Compare the colour difference between the original textile and the test specimen with the differences represented by the steps of the Grey Scale. The assessment of the specimen is the number of the Grey Scale step which corresponds to the contrast between the original textile and the test specimen. If this contrast lies between two numbers of the Grey Scale, an intermediate assessment, e.g. 3-4, is given.

NOTE: If it is desired, the assessment of change in colour may be qualified with a description of the colour change, e.g. bluer, redder, weaker, brighter or similar.

9.4.3 Visual assessment of staining of undyed cloths Staining of undyed cloths shall be assessed as follows:

- (a) Place a blank tested undyed cloth and the tested undyed cloth adjacent to each other in the same plane and orientated in the same direction (i.e. with respect to pattern) in the viewing cabinet (see Clause 7.9). Place a mask (see Clause 7.4) over the blank tested undyed cloth and the tested undyed cloth so that the viewed dimensions of each are similar to those of the Grey Scale chips.
- (b) If multifibre undyed cloth is being assessed, place a mask containing an aperture of such dimensions that only one fibre type of the tested or blank tested undyed cloth and the same fibre type of the original undyed cloth are visible.
- (c) Place the Grey Scale for assessing staining in the same plane and immediately above or below the blank tested and tested undyed cloth(s). Place a mask of similar dimensions to that used in Step (b), over the Grey Scale.
- (d) Compare the colour difference between the blank tested undyed cloth and tested undyed cloth with the differences represented by the steps of the Grey Scale. The assessment of staining is the number of the Grey Scale step which corresponds to the contrast between the blank tested and tested undyed cloths. Heavier staining in the area of a retained seam in the composite specimen shall not be assessed.