Standards
Association of
Australia

Australia
1788-1988

Australian Standard®
3546—1988

WOOL—
METHOD FOR THE MEASUREMENT OF AVERAGE YELLOWNESS OF GREASY WOOL

This Australian Standard was prepared by Committee TX/12, Testing of Wool. It was approved on behalf of the Council of the Standards Association of Australia on 11 December 1987 and published on 15 July 1988.

The following interests are represented on Committee TX/12:

Australian Council of Wool Exporters

Australian Wool Corporation

Australian Wool Testing Authority

CSIRO, Division of Textile Physics

Department of Defence

Department of Primary Industries and Energy

National Council of Wool Selling Brokers of Australia

University of New South Wales

Wool Council of Australia

Wool Scourers and Carbonizers Association of Australia

Wool Textile Manufacturers of Australia

This Standard was issued in draft form for comment as DR 86203.

AUSTRALIAN STANDARD

WOOL— METHOD FOR THE MEASUREMENT OF AVERAGE YELLOWNESS OF GREASY WOOL

AS 3546—1988

First published as AS 3546—1988.

PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.
ISBN 0 7262 5037 6

PREFACE

This Standard was prepared by the Association's Committee on Testing of Wool. It sets out a method to be used to measure the average yellowness of samples of greasy wool prepared for mean fibre diameter measurement in accordance with AS 1133. The method is not suitable for identifying the contamination by individual coloured fibres. For coloured wools, only the yellow component is measured.

Because of the difficulties in defining preparation procedures for the measurement of both lightness and yellowness of cleaned greasy wool, this Standard for measuring yellowness only has been produced. It is hoped that further research work will resolve these difficulties and allow a more complete specification of the colour of wool.

The method describes the preferred apparatus for the measurement. A statement on the precision of the method is given.

This Standard is one of a series of Standards for the sampling and testing of wool.

Other Standards in this series are as follows:

AS

1133 *Wool—Determination of the mean fibre diameter of raw wool*

1134 *Method for the determination of wool base and vegetable matter base in raw wool*

1362 *Wool—Method for calculation of combined test certificates for yield and fineness of raw wool in consignments*

1363 *Wool—Grab sampling of greasy wool*

1809 *The preservation of the integrity of raw wool samples for display*

1980 *Wool—Core sampling of raw wool in bales*

2104 *Method for matching and building sale lots of greasy wool in bales by objective measurement*

2274 *Wool—Requirements for the issue of a test certificate*

2720 *Wool—Measurement of mean staple length—Method using the CSIRO staple length meter*

2721 *Wool—Method for subsampling of staples from grab samples*

2810 *Wool—Determination of mean staple length and mean staple strength*

XXXX *Wool—Method for the measurement of resistance to compression**

YYYY *Wool—Method for the measurement of the mean and distribution of fibre diameter using a fibre diameter analyser (FDA)**

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* In course of preparation.

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FOREWORD

It is difficult for the human eye to make reliable quantitative assessments of colour and there can be considerable variability in the degree of accuracy with which observers detect differences in colours. Moreover, colour differences which are easy to see when the objects are side-by-side, are very much harder to assess when the objects are separated in time or distance. An objective measurement of colour is therefore desirable.

A complete measurement of the colour of an opaque material such as wool is obtained by measuring the proportion of light reflected from its surface throughout the visible spectrum. It is, however, possible to obtain useful information by measuring the reflection in the red, green and blue regions. Under the conditions specified by the International Commission of Illumination (CIE)*, these three readings are referred to as the tristimulus values X (red), Y (green) and Z (blue). The values provide sufficient information to describe colour for the specified light source and viewing conditions. They can be used directly, or they can be transformed, to provide information concerning particular aspects of colour.

The colour of wool is influenced, not only by its inherent colour, but also by the grease, suint, dirt, vegetable matter and other impurities present. The colour of the cleaned wool is usually of interest since most of these impurities are removed during processing and generally do not affect the colour of the final product. This Standard relates to a measurement on the laboratory sample prepared for mean fibre diameter measurement according to AS 1133. For greasy wool a core sample is scoured and carded to remove most of the contaminants that will ultimately be removed during processing.

In this Standard only the aspect of yellowness is addressed. Yellowness relates to the relative intensities of reflectance in the green and blue regions of the spectrum. The yellowness index given by this Standard is derived from the tristimulus values Y and Z as $Y - Z$. As an illustration of the range of this parameter for wool, the following values are given:

Colour description	*$Y - Z$ units*
Very white	−2
White	0
Creamy	3
Canary yellow stain	12

Wools which are not well identified solely by yellowness measurement include brown, black and green.

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* CIE—Commission Internationale de l'Eclairage. See CIE Publication No 15 (E—1.3.1) 1971.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

WOOL—METHOD FOR THE MEASUREMENT OF AVERAGE YELLOWNESS OF GREASY WOOL

1 SCOPE. This Standard sets out a method for determining the average yellowness of a sample of greasy wool cores taken from a lot by the method described in AS 1980. The procedures to be used to clean and prepare the sample prior to measurement are those set out in AS 1133 and are not described in this Standard.

2 APPLICATION. The method is only applicable to the determination of the yellowness of greasy wool prepared for mean fibre diameter measurement in accordance with AS 1133. The result is the average yellowness after cleaning and carding.

The method is not suitable for detecting dark fibre contamination, or the presence of urine-stained wool. For coloured wools, only the yellow component is measured.

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

AS

1133 Wool—Determination of the mean fibre diameter of raw wool

1134 Method for the determination of the wool base and vegetable matter base in raw wool

1980 Wool—Core sampling of raw wool in bales

2001 Methods of test for textiles
Method 1: Conditioning procedures (AS 2001.1)

4 PRINCIPLE. Test specimens are drawn from the prepared sample and arranged so as to present a flat surface to the measuring instrument. The CIE tristimulus values Y and Z are measured and the yellowness is reported as $Y - Z$.

5 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

5.1 Greasy wool—unprocessed wool from sheep or wool shorn from sheepskins.

5.2 Laboratory sample—the carded material prepared for mean fibre diameter measurement in accordance with AS 1133.

5.3 Test specimen—the randomly drawn portion, representative of the carded and conditioned laboratory sample, to be measured.

6 APPARATUS. The following apparatus is required:

6.1 Tristimulus colorimeter or spectrophotometer. An instrument capable of yielding data relating to Illuminant C and the 2-degree observer. An instrument based on either the 0/45 or 45/0 geometry of the CIE is suitable.

NOTE: The Hunterlab* D25-2M colorimeter is recommended, but any other instrument conforming to the CIE specifications may be used, provided that its accuracy and reproducibility are not inferior to the Hunterlab D25-2M.

A sphere instrument shall have an efficient gloss trap.

6.2 Cream working tile. A cream, glossy, ceramic tile to be used as a working Standard.

6.3 White reference tile. A white, glossy, ceramic tile to be used as a check of the cream working tile. If the manufacturer's white standard is a white, glossy, ceramic tile it may be used as the white reference tile.

6.4 Specimen holder. A specimen holder (cell), as described in Appendix A, in which the test specimen is compressed behind glass for measurement.

6.5 Conditioning atmosphere. Means of producing and maintaining a standard laboratory atmosphere of 20 ±2°C and 65 ±2 percent r.h. to condition laboratory samples in accordance with AS 2001.1.

7 PREPARATION OF TEST SPECIMENS. The procedure shall be as follows:

(a) Bring the laboratory sample to equilibrium in the standard testing atmosphere as described in AS 2001.1.

(b) Remove, with tweezers, any vegetable matter or other non-wool material likely to affect the colour measurement.

(c) Depending on the measurement procedure to be used (see Clause 9.1), draw one or two test specimens from the laboratory sample, each of sufficient total mass to give the packing density of 160 ±5 kg/m^3 and the thickness specified in Appendix A.

NOTES:

1. A mass of 5.0 ±0.1 g is suitable for the specimen holder described in Appendix A.
2. Airflow test specimens each of 2.5 ±0.004 g may be aggregated.

8 CALIBRATION.

8.1 General. The following procedure does not apply to spectrophotometers for which the instrument settings cannot be adjusted in accordance with Appendix B. In this case, calibrate the instrument in accordance with the manufacturer's instructions and adjust the measurements given by the method in Appendix C.

8.2 Calibration of cream working tile and white reference tile. Calibrate the cream working tile and white reference tile in accordance with Appendix B.

8.3 Calibration of instrument. Measure the cream working tile and adjust the instrument to give the calibration values for that tile. The frequency of this procedure shall be at least every 4 h to ensure that measurements of the cream working tile give results which differ by no more than 0.3 in any tristimulus value from the calibration values.

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