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WOOL—DETERMINATION OF MEAN STAPLE LENGTH AND MEAN STAPLE STRENGTH

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Australian Wool Corporation
Australian Wool Testing Authority Ltd
CSIRO, Division of Textile Physics
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PREFACE

This standard was prepared by the Association's Committee on Testing of Wool under the direction of the Textile Standards Board. It describes the measurement of staple length and staple strength of greasy wool. The method of selecting staples is described in AS 2721, Wool—Method for Subsampling of Staples from Grab Samples.

Staple length is defined as the length of the unrestrained staple measured along its axis. Staple strength is defined as the maximum force of rupture per unit linear density of the staple. This standard differs from previous standards for length and strength measurement in that it provides for a non-machine-specific procedure using the principles stated in AS 2720, and AS 2722, and that the linear density of the staple is measured gravimetrically. As a consequence, measurements of staple strength using this standard may differ, in exceptional cases, from measurements obtained using AS 2722.

This standard is one of a series of standards for the sampling and testing of wool. The other standards in the series are as follows:

AS 1133 Method for the Determination of Fibre Diameter of Raw Wool*

AS 1134 Method for the Determination of Wool Base and Vegetable Matter Base in Raw Wool

AS 1362 Wool—Method for the Calculation of Combined Test Certificates for Yield and Fineness of Raw Wool in Consignments

AS 1363 Wool—Grab Sampling of Greasy Wool

AS 1401 Method for Sonic Fineness Testing of Raw Wool*

AS 1809 The Preservation of the Integrity of Raw Wool Samples for Display

AS 1980 Wool—Core Sampling of Raw Wool in Bales

AS 2274 Requirements for the Issue of a Test Certificate for Raw Wool*

AS 2720 Wool—Measurement of Mean Staple Length—Method Using the CSIRO Staple Length Meter

AS 2721 Wool—Method for Subsampling of Staples from Grab Samples

AS 2722 Wool—Determination of Mean Staple Strength—Method Using the CSIRO Staple Strength Meter

AS XXXX Wool—Method for the Measurement of the Colour of Wool†

In particular, this standard relies on the application of AS 1363, and on AS 2721.

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*Under revision.

†In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

WOOL—DETERMINATION OF MEAN STAPLE LENGTH AND MEAN STAPLE STRENGTH

FOREWORD

The measurement of staple length and staple strength of wool may be used in conjunction with other objective measurements to assess potential worsted processing performance.

There are a number of methods available for the measurement of staple length. These differ in their methods of detecting the ends of the staple and the tension or constriction placed on the staple during measurement. For these reasons the measurements result in different values of staple length although most of these are interrelated.

This measurement of staple strength differs from other tensile tests on fibre bundles in that it is not a measure of the intrinsic strength of the material. This test determines the force required to break the staple at its weakest position, which is usually the point of minimum cross-sectional area. The measurement of position of break in a staple is the method of describing this position.

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METHOD

1 SCOPE. This standard sets out a method for the measurement of mean staple length, mean staple strength and position of break of greasy wool suitable for worsted processing.

2 APPLICATION. The method is applicable to staples of greasy wool drawn in accordance with AS 2721. An estimate of the precision of the method is given in Clause 8.

The method may also be applied to staples drawn in any other way. However, the precision of the measurement will depend upon the method of drawing the staples, the number of staples drawn and measured, and, if the value is to be referred to the bulk, the method of obtaining the sample.

The method is not applicable to short greasy wool suitable solely for woollen processing or to raw wool in other forms.

In determining mean staple strength, the method can only be applied to staples of sufficient length and thickness to be gripped in the two sets of jaws used for the measurement.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1363	Wool—Grab Sampling of Greasy Wool
AS 2001.1	Methods of Test for Textiles, Part 1—Conditioning Procedures
AS 2720	Wool—Measurement of Mean Staple Length—Method Using the CSIRO Staple Length Meter
AS 2721	Wool—Method for Subsampling of Staples from Grab Samples
AS 2722	Wool—Determination of Mean Staple Strength—Method Using the CSIRO Staple Strength Meter

4 DEFINITIONS. For the purpose of this standard, the following definitions apply:

4.1 Average linear density—the clean staple mass per unit staple length at standard conditions.

4.2 Grab sample—the greasy wool drawn by a single operation of a grab machine in accordance with AS 1363.

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

4.4 Position of break—an indication of where a staple breaks during extension, determined by comparing the masses of wool in the broken portions of the staple.

4.5 Sample—the combined grab samples representative of the wool in a lot drawn in accordance with AS 1363.

4.6 Second cut—a short staple resulting from a second attempt to shear wool from the sheep. It differs from a normal staple in that both ends are severed and no tip end is evident.

NOTE: Second cuts are included as staples (see Clause 4.7).

4.7 Staple—a well-defined bundle of fibres which has been removed from the greasy wool as a unit. It includes second cuts.

4.8 Staple axis—an imaginary line along the staple in the direction of the majority of fibres.

4.9 Staple length—the projected length of the outline of an unrestrained staple, as measured along its axis.

4.10 Staple strength—the maximum force of rupture per unit of average linear density.

5 PRINCIPLE. The lengths of a number of staples, including second cuts, if any, drawn from samples of greasy wool, are measured. The mean staple length, and its distribution parameters are calculated from the data.

The strengths of the same staples are measured. The mean staple strength and its distribution parameters, and the position of break are calculated from the data.

6 APPARATUS.

6.1 A means of measuring staple length which gives results that are equivalent to those obtained by the method described in AS 2720. An instrument meeting this requirement is described in Appendix A.

6.2 A staple strength measuring instrument, consisting of the following:

(a) Jaws for gripping the ends of a staple without damage or slippage.

(b) A means for extending a staple gripped at both ends at a rate of 50 mm/s to 300 mm/s.

(c) A force transducer capable of measuring the peak force during extension to 1 N.

(d) A means of determining the mass of each part of each broken staple to 2 mg.

A suitable instrument is described in Appendix A.

6.3 A means of producing the standard atmosphere of 20 ± 2°C and 65 ± 2 percent r.h. stated in AS 2001.1.

7 PROCEDURE.

7.1 Preparation of staples. At least 60 staples shall be drawn and prepared in accordance with AS 2721. The staples shall be allowed to relax in the staple trays in the standard atmosphere for at least 24 h prior to measurement.

7.2 Measurement. The procedure shall be as follows:

(a) Before any series of measurements is made, carry out any pre-measurement checks required to ensure that the instrument is performing within its specifications.

(b) Make all measurements in the standard atmosphere (see Clause 6.3).

(c) Measure and record the length of each prepared staple to the nearest 1 mm.

Record the number of staples for which there is a result. All prepared staples shall be submitted for measurement. However, the instrument may

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