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WOOL—DETERMINATION OF MEAN STAPLE STRENGTH—METHOD USING THE CSIRO STAPLE STRENGTH METER

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Australian Wool Corporation
Australian Wool Testing Authority Ltd
CSIRO, Division of Textile Physics
Department of Defence
Department of Primary Industry
National Council of Wool Selling Brokers of Australia
University of New South Wales
Wool Council of Australia
Wool Scourers and Carbonisers Association of Australia
Wool Textile Manufacturers of Australia

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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 strength of greasy wool using the CSIRO Staple Strength Meter. The method of selecting staples is detailed in AS 2721, Wool—Subsampling of Staples from Grab Samples, one of three standards relating to the sampling and measurement of staple length and staple strength.

Staple strength is the maximum force of rupture divided by the mean linear density of the staple. The definition can be subject to different interpretations and methods for the objective measurement of this strength may also differ. This standard defines staple strength as the result of a measurement using the CSIRO Staple Strength Meter in accordance with a specified procedure.

The standard is one of a series for the sampling and testing of wool. The other standards in the series are listed below. In particular, this standard relies on the application of AS 1363, Wool—Grab Sampling of Greasy Wool, and on AS 2721, Wool—Subsampling of Staples from Grab Samples.

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	Method for Calculation of Combined Test Certificates for Yield and Fineness of Greasy Wool in Consignments
AS 1363	Wool—Grab Sampling of Greasy Wool
AS 1401	Method for the 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	Wool—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—Subsampling of Staples from Grab Samples
AS ZZZZ	Wool—Method for the Measurement of the Colour of Wool†.

*In course of revision.
†In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

WOOL—DETERMINATION OF MEAN STAPLE STRENGTH—METHOD USING THE CSIRO STAPLE STRENGTH METER

1 SCOPE. This standard sets out a method for the measurement of staple strength of greasy wool which is suitable for combing, using the CSIRO Staple Strength Meter.

2 APPLICATION. The method is applicable to staples of greasy wool longer than 55 mm, drawn in accordance with AS 2721, and of a linear density greater than 1 ktex. An estimate of the precision of the method is given in Clause 9.

The method may also be applied to staples of greasy wool longer than 55 mm 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, then the method of obtaining staples will affect the precision.

The method is not applicable to greasy wool suitable solely for carding because such types include wool with poorly defined staples. The method is not applicable to raw wool in other forms.

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

AS 1363 Wool—Grab Sampling of Greasy Wool

AS 2001 Methods of Test for Textiles
AS 2001.1 Part 1—Conditioning Procedures

AS 2721 Wool—Subsampling of Staples from Grab Samples.

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

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

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

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

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

4.5 Staple strength—the maximum force of rupture per unit of linear density of the staple.

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

5 PRINCIPLE. The strengths of a number of staples drawn from samples of greasy wool are measured. The mean staple strength and the estimated position of break are calculated from the data (see Clause 7.2, Note 1).

6 APPARATUS.

6.1 CSIRO staple strength meter. A staple strength measuring instrument, as described in detail in Appendix A, consisting of the following:

(a) Jaws for gripping the ends of a staple, and for measuring staple linear density at a constant pressure and at a fixed time after closure.

(b) A ram for extending a staple gripped at both ends at a rate of 100 mm/s to 200 mm/s.

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

6.2 Conditioning. 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 to be measured shall be drawn from the grab samples or the sample representing the lot in accordance with AS 2721. The staples shall be prepared by allowing them to relax unrestrained in the standard atmosphere of 20 ± 2°C and 65 ± 2 percent r.h. stated in AS 2001.1 for at least 24 h.

7.2 Measurement. The procedure shall be as follows:

(a) Before any series of measurements is made, carry out the premeasurement checks required to ensure that the staple strength measuring device is performing within its specifications.

(b) Make all measurements in the standard atmosphere of 65 ± 2 percent r.h. at a temperature of 20 ± 2°C (see Clause 6.2).

(c) Place each staple into the jaws of the instrument so that the fibres in the base and tip are gripped. The base end of the staple should extend 3 mm beyond the calibrated jaw and the tip end of the staple 5 mm beyond the other jaw. Close the jaws to grip the staple firmly. Measure and record the linear density of the base of the staple with the calibrated jaw and extend the staple to rupture (see Note 1).

(d) Reject a staple if—

  (i) its length is less than the minimum gauge length of the instrument (see Appendix A, Fig. A1);

  (ii) its linear density is outside the specified or calibrated range of the instrument (less than 1 ktex or greater than 3.5 ktex for the instrument described in Appendix A);

  (iii) it is seen to pull through the jaws during extension.

(e) Measure and record the maximum force required to rupture each staple.

(f) Estimate the position of break in the ruptured staple and record whether the rupture occurred in the tip, middle or base region.