

Australian/New Zealand Standard™

Wool—Fleece testing and measurement

Method 3: Measurement of mean fibre diameter using Airflow and Sonic A instruments

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TX/12, Wool to supersede AS/NZS 4492.3(Int):1997.

This test method covers the fineness measurement of cleaned samples of greasy fleece wool by Airflow and Sonic A instruments.

The method is based on methods for testing core samples in AS/NZS 1133, *Wool—Determination by the Airflow Method of the mean fibre diameter of core samples of raw wool* and IWTO(E)-7-73(E), *Method for sonic fineness testing of raw wool*.

The measurements should be regarded as relative, not absolute values, and they should only be used for within-flock comparisons.

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

METHOD

1 SCOPE This Standard sets out a procedure for obtaining the mean fibre diameter of a sample of fleece wool. Included are requirements for drawing subsamples and preparing test specimens.

2 OBJECTIVE The objective of this Standard is to provide the wool industry with methods of determining mean fibre diameter by Airflow and Sonic A instruments for the purposes of ranking sheep or classing fleeces according to mean fibre diameter.

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

AS

2001 Methods of test for textiles

2001.1 Part 1: Conditioning procedures

AS/NZS

1133 Wool—Determination by the Airflow Method of the mean fibre diameter of core samples of raw wool

AS/NZS

4492 Wool—Fleece testing and measurement

4492.2 Method 2: Determination of washing yield and clean fleece weight

IWTO

6 Method of test for the determination of the mean diameter of wool fibres in combed sliver using the airflow apparatus

52 Conditioning procedures for testing textiles

4 PRINCIPLE The mean fibre diameter of a compressed plug of scoured fibres, free of vegetable matter is measured by the resistance to flow of air through the plug in the Airflow Method and resistance to sound waves in the Sonic A Method.

5 APPARATUS The following apparatus is required:

- (a) Either an Airflow fineness meter in accordance with AS/NZS 1133 or a Sonic A fineness meter, in accordance with Appendix A.
- (b) A balance with a readability of 0.001 g.
NOTE: An analogue balance with marked increments of not more than 0.002 g or a digital balance with a count of not more than 0.001 g is suitable.
- (c) Suitable apparatus to homogenize and open the scoured, dried wool subsample without excessive loss of wool, while removing dust and most vegetable matter.

NOTES:

- 1 The same apparatus should be used for calibration (Appendix B) and measurement.
- 2 Suitable apparatus is the Shirley Analyser (Wool Model) (see AS/NZS 1133). However, other apparatus may be used, e.g. Shirley Trash Separator (see Appendix C) or hand carding.
- (d) A barometer for measuring barometric pressure if local data is not readily available.
- (e) Means of producing and maintaining a laboratory atmosphere with minimal changes in temperature ($\pm 2^{\circ}\text{C}$) and relative humidity ($\pm 3\%$) e.g. as described in IWTO 52 and AS 2001.1.

NOTE: Where the atmosphere conditions deviate from the standard atmosphere of 20°C and 65% RH but have remained within the limits over the period of conditioning and measurement, correction factors as set out in AS/NZS 1133 should be applied.

6 CALIBRATION The following shall apply:

- (a) Calibration procedures shall be as set out in AS/NZS 1133 (for the Airflow instrument) and Appendix B (for the Sonic A instrument).

NOTE: Both instruments are calibrated by using samples of all the wools in a valid set of Interwoollabs IH standard tops (see Footnote in Appendix B), in which the fibres have been prepared using the same carding process as that used on the specimens to be tested.

- (b) Both calibration samples and test specimens shall be conditioned to equilibrium, and measurements made, in this atmosphere.

NOTE: Where checks are required, previously measured samples may be used to validate the measurement procedures, and the current calibration. Within the laboratory, the 95% confidence limits on a single measurement are $\pm 1.2 \mu\text{m}$.*

7 SAMPLE PREPARATION The following procedures shall apply:

- (a) *Scouring and drying the sample* The method and the requirements for scouring and drying the sample shall be in accordance with AS/NZS 4492.2.

* MORGAN, P.D. Fleece measurement interlaboratory trials—An analysis of the factors influencing the precision of test results. *Wool Technology and Sheep Breeding*. March/April 1990.

- (b) *Drawing the subsample* One subsample, preferably of 15 g, shall be drawn so as to be representative of the sample. Where the sample is less than 15 g, the subsample shall comprise the whole sample.
- (c) *Conditioning* The opened subsample shall be brought to equilibrium within constant laboratory atmosphere (see Clause 5(e)) and tested in this atmosphere.

NOTES:

- 1 Each laboratory should determine the time interval for equilibrium applicable to their laboratory atmosphere.
 - 2 For a well-opened subsample to obtain equilibrium in a well-ventilated room, a minimum of 4 h exposure is considered necessary.
- (d) *Vegetable matter removal and subsample homogenization* Vegetable matter and subsample homogenization shall be achieved by the use of suitable apparatus (see Clause 5, Item (c)) used in accordance with the conditions set out in AS/NZS 1133.
NOTE: One passage of raw material through either the Shirley Analyser or the Shirley Trash Separator is usually sufficient to meet sample preparation requirements.
 - (e) *Test specimen* The test specimen shall be drawn at random from the homogenized and conditioned subsample. The test specimen shall weigh 2.500 ± 0.004 g.

8 PROCEDURE

8.1 Airflow Method The procedure shall be as follows:

- (a) Ensure that the instrument is level, and that the float and liquid level are set to zero. Check that the chamber and flow channels are free from wool fibre fragments and dust.
- (b) Pack the weighed test specimen into the measurement cell with minimal contact from external sources. Follow the measurement procedure in accordance with AS/NZS 1133.

8.2 Sonic A Method The procedure shall be as follows:

- (a) Check that the chamber is free from wool fibre fragments and dust.
- (b) Ensure that the indicator shows zero with the instrument on a firm level surface. Zero setting is carried out with the instrument switched off for the meter display type and with power on for the digital display type. In both cases the chamber must be empty and at its lowest release position.

Meter display—set the pointer to zero with the mechanical screw adjustment.

Digital display—set the readout to 0.00 by operating the small screwdriver adjustment on the display unit.

- (c) Switch on the instrument and allow a 30 minute warm-up time before commencing testing.
- (d) Check that the chamber is free from wool fibres and dust.
- (e) Insert the check plug and adjust the reading of the indicator to the set point specified for the instrument. Remove the check plug. The sonic fineness meter is sensitive to changes in barometric pressure. When making routine tests, record the barometric pressure. If it changes by more than 10 mm mercury insert the check plug and readjust the value to 600 mV or the set point specified for the instrument.
- (f) Pack the test specimen evenly into the constant volume chamber using forceps. Push the fibres down with the short end of the packing rod and close the chamber, making sure that the plunger seats firmly on the top of the chamber.

- (g) Read the indicated mean fibre diameter to the nearest 0.1 μm or equivalent scale reading in millivolts.
- (h) Take the specimen out of the chamber, then repack it in the reverse direction without teasing it out, using forceps, not fingers, to handle the specimen so as not to contaminate or change the moisture regain of the specimen.
- (i) Close the chamber and read the mean fibre diameter.

9 CALCULATION The mean fibre diameter shall be calculated in micrometres, to one decimal place.

10 PRECISION An estimate of the 95% confidence limits for a single test specimen measured on one instrument is $\pm 1.2 \mu\text{m}$ for wools of mean fineness of 26 μm or less.*

11 TEST REPORT The following shall be reported:

- (a) Unique sample identification.
- (b) The mean fibre diameter to nearest 0.1 μm .
- (c) A reference to this Australian/New Zealand Standard, i.e. AS/NZS 4492.3.

* MORGAN, P.D. Fleece measurement interlaboratory trials—An analysis of the factors influencing the precision of test results. *Wool Technology and Sheep Breeding*. March/April 1990.

APPENDIX A

SONIC A FIBRE FINENESS APPARATUS

(Normative)

A1 SCOPE This Appendix sets out a specification for sonic fineness apparatus known as Sonic A.

A2 GENERAL The sonic fineness meter Model A (Sonic A) uses a test specimen mass of 2.500 ± 0.004 g. The mean fibre diameter is read either from a pointer meter or a digital readout display graduated either in micrometres or millivolts. The relationship between millivolts and micrometres is determined when the apparatus is calibrated as described in Appendix B.

A3 SPECIFICATION

A3.1 Figure A1 The apparatus shall be as shown in Figure A1. Air is oscillated at about 50 Hz through the wool packed in the constant volume chamber V by means of the pressure generating transducer P. An attenuated oscillation of air in the top chamber is sensed by the detecting transducer T. The resultant electrical signal is amplified by the electronic circuitry E and the output is displayed either on a millivolt meter or on a digital readout to the equivalent of $0.1 \mu\text{m}$.

A3.2 Figure A2 The constant volume chamber shall have the dimensions shown in Figure A2. The chamber shall be made of brass or stainless steel and shall have a smooth finish so that the plunger slides easily into the base without trapping fibres. The holes in the perforated ends of both chamber base and plunger shall be finished cleanly with no roughness or burrs.

A3.3 Figure A3 The check plug shall be made of brass or stainless steel to the dimensions shown in Figure A3. It shall be filled with the correct mass of non-hygroscopic fibres and the plug permanently sealed. The rubber 'O' ring shall form an airtight seal between the plunger and the chamber. The reading with the check plug in place should be about three-quarters of the scale range.

A3.4 Figure A4 The dimensions of the packing rod shall be as shown in Figure A4. The body of the rod may be constructed of suitable plastics material with a smooth finish.

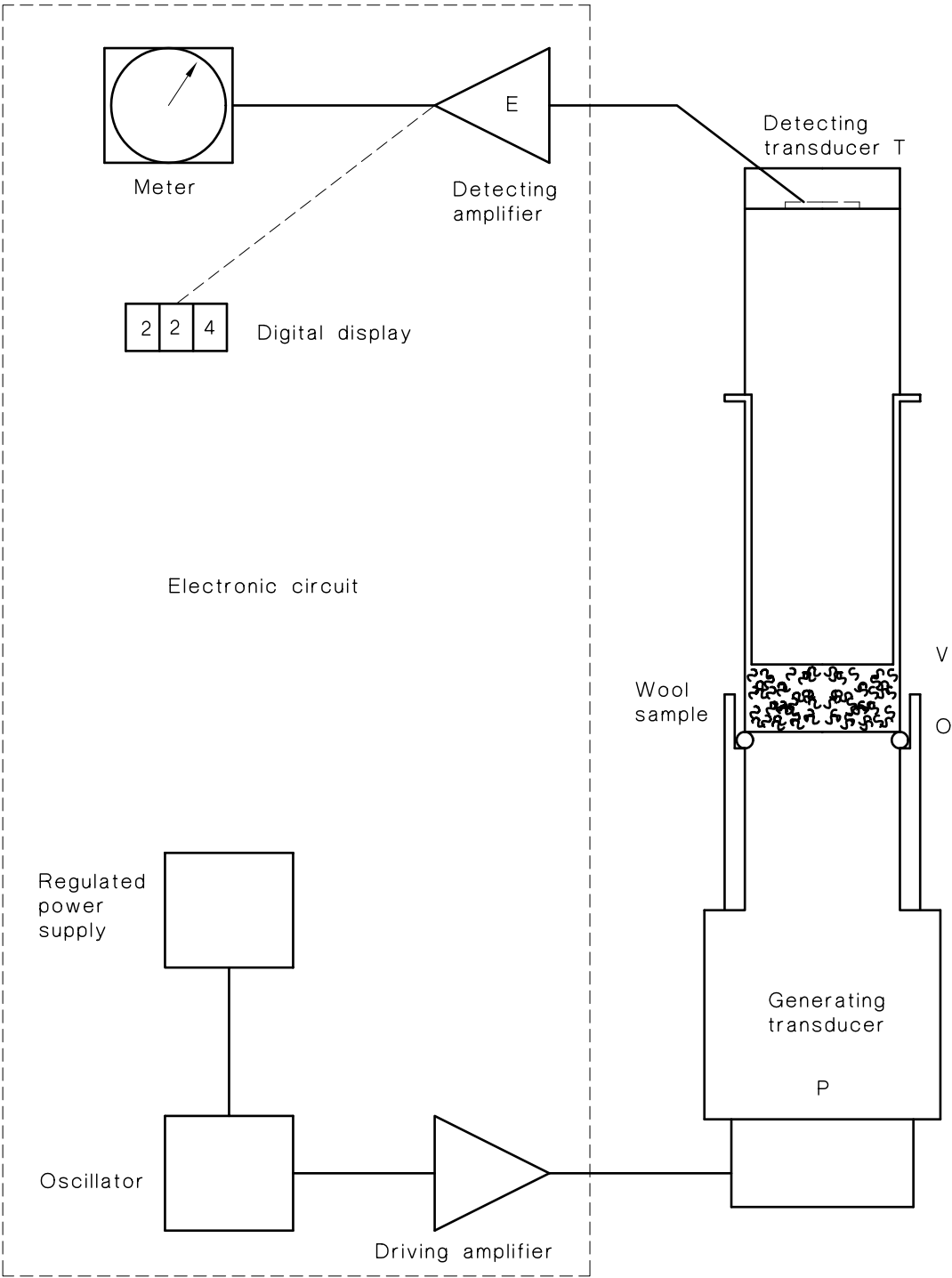
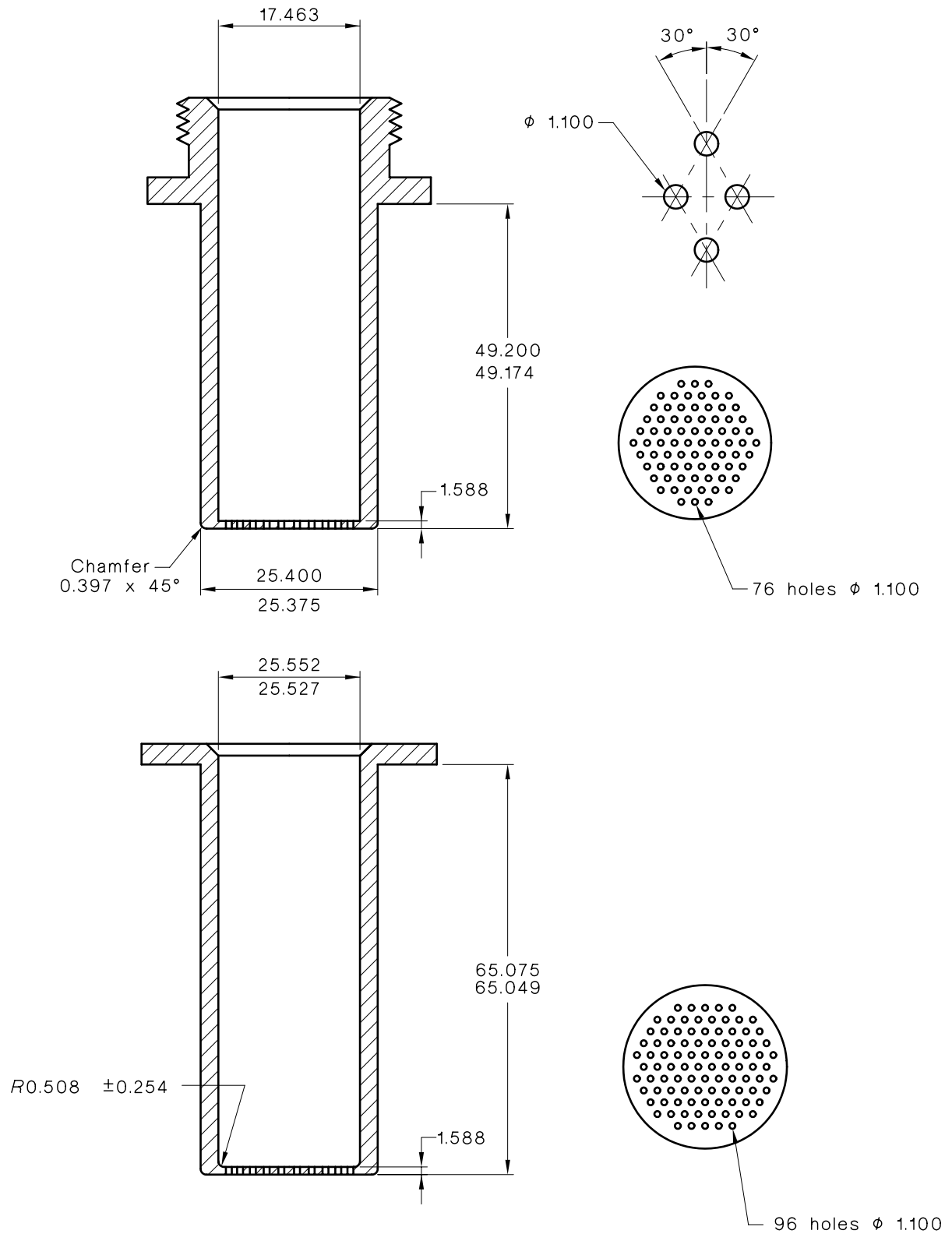


FIGURE A1 DIAGRAM OF SONIC A FINENESS APPARATUS



DIMENSIONS IN MILLIMETRES

FIGURE A2 DIMENSIONS OF THE CONSTANT VOLUME CHAMBER

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