
INTERNATIONAL WOOL TEXTILE ORGANISATION

TECHNOLOGY & STANDARDS COMMITTEE

Raw Wool Group

Chairman: A.C. BOTES (South Africa)

NICE MEETING

November 2000

RWG Appendix No: 01

The Certification of Standard Deviation of Diameter of Raw Wool Measured by OFDA

By

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SUBMISSION

SUMMARY

An ILRT report to the Sliver Group meeting in Christchurch recommended that

“If one were measuring raw wool, one should use the “Tops” Calibration to obtain the Standard Deviation and the “Cores Calibration to obtain the Mean Fibre Diameter.”

This submission recommends that one of two approaches be taken with respect to the wording in the Test Method (IWTO-47) for the measurement of Standard Deviation (SD) using OFDA:

- A “Tops” Calibration be used to obtain the Diameter Distribution Data for Raw Wool and a “Cores” Calibration used to obtain the Mean Fibre Diameter (MFD), or
- The Diameter Distribution Data to remain uncertifiable when the “Cores” Calibration is used for measurement.

It should be noted that the Standard Deviation as measured using OFDA on the “Cores” Calibration is indicative of the Standard Deviation assigned to the Interwoollabs Harmonisation Tops. However, for the “Cores” Calibration it is inherently biased due to the effects of Fibre Relaxation on the measurement of Fibre Diameter when using the OFDA.

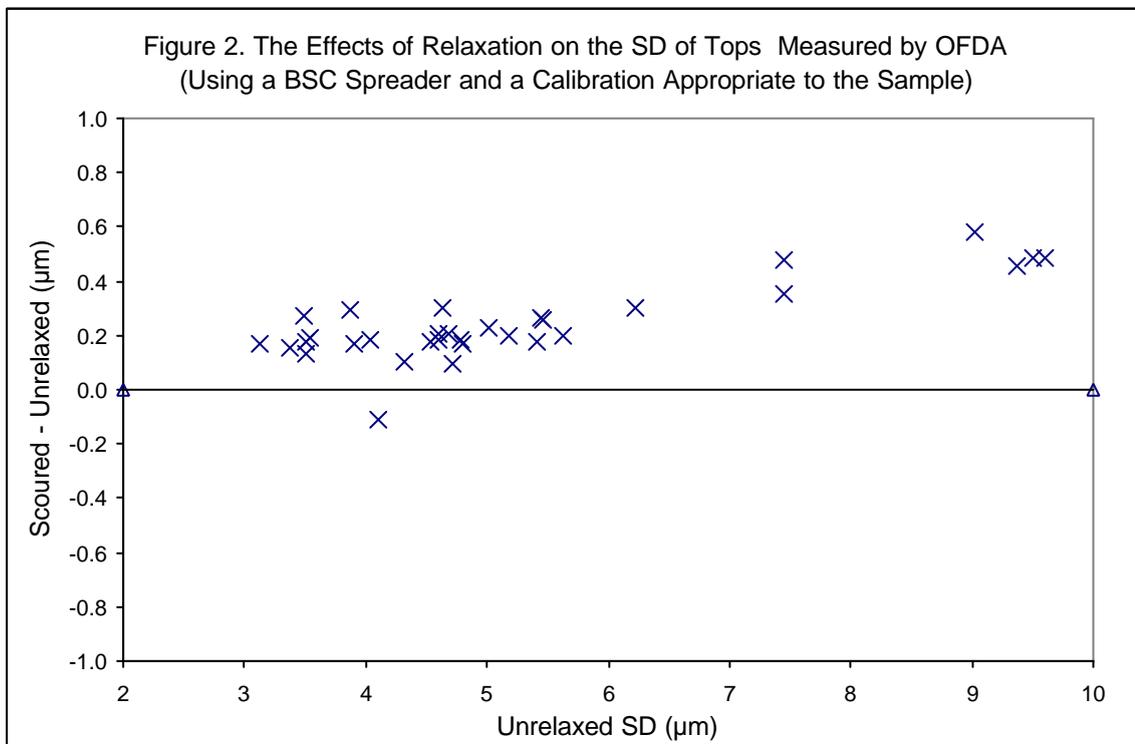
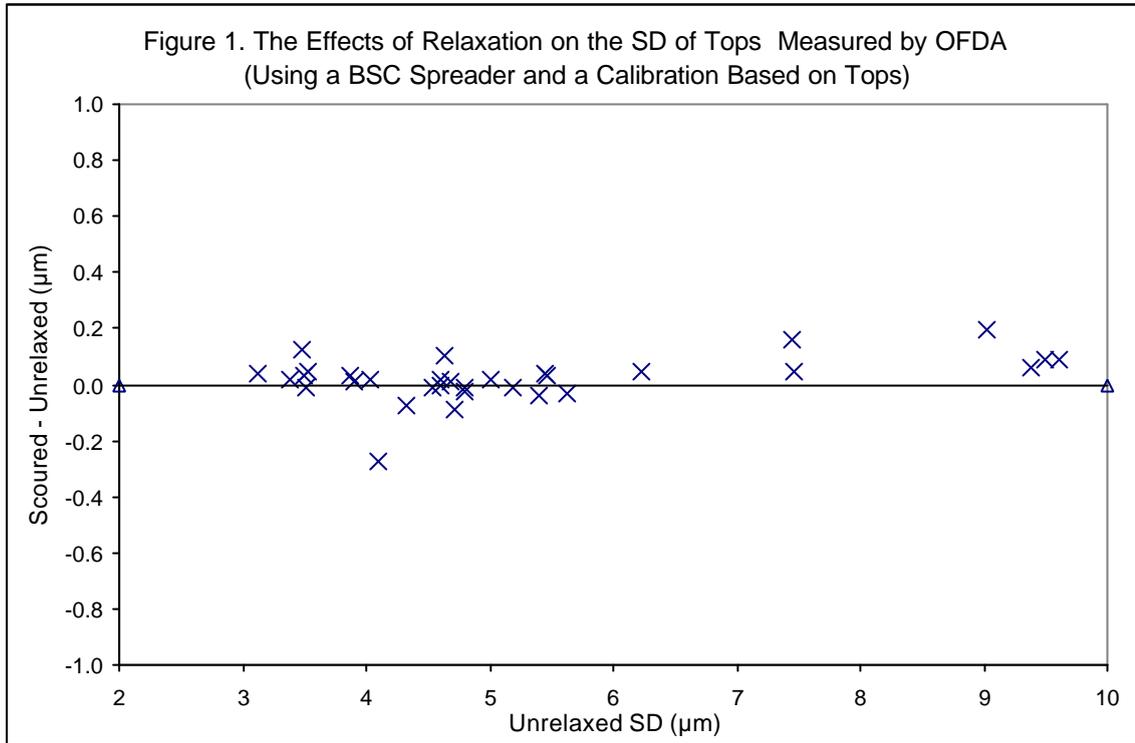
BACKGROUND

There are for two different calibration requirements within IWTO-47:

- the “Cores” Calibration for measuring Raw Wool: and
- the “Tops” Calibration for measuring Sliver.

A report⁽¹⁾ to the Christchurch meeting of IWTO confirmed the need to have different calibration procedures for measuring the Mean Fibre Diameter (MFD) of different sample types (ie Raw Wool and Sliver). It confirmed earlier reports^(2,3) which showed that the measurement of MFD using the OFDA was influenced by the fibre relaxation preparation procedures which restored the original fibre curvature that had been present in the Raw Wool. Raw Wool is generally of higher Fibre Curvature than Sliver as the carding and combing processes straighten individual fibres. Hence, if Raw Wool and Top are measured on the same calibration a difference in measured MFD is observed.

It has been demonstrated that, when the "Cores" Calibration is used to measure top samples that had been cut and washed to emulate the form of scoured core samples of greasy wool, a bias in the measured Standard Deviation was introduced (Figures 1 and 2 below are reproduced from the Christchurch Report)⁽¹⁾.



Following discussions in the Christchurch Sliver Group Meeting after the presentation of the Report, the authors were requested to consider whether any recommended changes to the text of the Test Method should be prepared and brought forward for consideration at the Nice Meeting.

The authors have reviewed the report and now offer two alternate recommendations for consideration by the Raw Wool Group:

1. **for Raw Wool only** the Test Method (IWTO-47) be modified to exclude the Certification of Standard Deviation, Coefficient of Variation of Fibre Diameter and the Diameter Histogram until such time as the manufacturer of the OFDA resolves the bias in Standard Deviation introduced by the “Cores” Calibration; or
2. **for Raw Wool only** the Test Method (IWTO-47) be modified to include a requirement that where IWTO Certification of Standard Deviation and/or Coefficient of Variation of Fibre Diameter is required that they should be derived from a measurement made using the Calibration prepared for “Tops”.

The relevant changes for both options are included as an Appendix to this submission.

REFERENCES

1. ILRT Group, *The Effect of Fibre Relaxation on The Mean Fibre Diameter and Fibre Diameter Distribution Measured by LASERSCAN and OFDA*, IWTO Technology and Standards Committee, Report SG 04, Christchurch, April 2000.
2. Turpie, D.W.F., “Changes in Dimensions of Calibration Samples Snippets with Changes in Pre-Treatment.”, IWTO Technical Committee, Report 16, Cape Town Meeting, April 1996.
3. Baxter, B.P., “IWTO Sliver Group – Boston May 1997 Some notes on the effects of relaxation on mean fibre diameter measurement”, IWTO Technology and Standards Committee, Sliver Group, Appendix 1, Boston, May 1997.

APPENDIX**IWTO-47 - Recommendations for Changes**

Option 1: Excluding the Certification of Standard Deviation, Coefficient of Variation and the Histogram for Raw Wool only.

5. Essential Requirements

(f) When an IWTO Certificate is to be issued which includes Mean Fibre Diameter, The the instrument must be calibrated prior to use, using snippets cut and prepared from Interwoollabs IH Standard Tops^(footnote 1) by exactly the same method normally used for preparing test specimens. The calibration shall be verified using the procedure and criteria shown in Appendix C.

(g) Each prepared slide must be measured on a setting of either "wholeslide x 1" or "wholeslide x 2" with the requirement that at least 2,000 fibre snippets are measured.

(h) The measuring system shall minimise the acceptance of multiple measurements on a single fibre snippet.

7.1 Report on Individual Tests

Additional information for Sliver Samples only^(footnote 7) may include:

(a) The standard deviation of fibre diameter in micrometres to one decimal place if measured using the Calibration for Top Sliver.

(b) The coefficient of variation of fibre diameter as a percentage to the nearest whole number if the measurements of MFD and SD were made using the appropriate calibrations as outlined in Clause 5.

(c) The distribution of fibre diameter as a frequency table or histogram with data grouped into appropriate classes if measured using the Calibration for Top Sliver.

Add Footnote 7 to page 10 as follows:

7. For Raw Wool only the Standard Deviation of Diameter has been shown to be biased when a calibration derived for greasy core sample measurements as described in Appendix B. The exclusion of reporting the distribution characteristics for Raw Wool will be reviewed when the manufacturer resolves the reason for the bias.

Option 2: Including the Certification of Standard Deviation, Coefficient of Variation by measuring them with a "Tops" Calibration.

5. Essential Requirements

(f) When an IWTO Certificate is to be issued which includes Mean Fibre Diameter, The the instrument must be calibrated prior to use, using snippets cut and prepared from Interwoollabs IH Standard Tops^(footnote 1) by exactly the same method normally used for preparing test specimens. The calibration shall be verified using the procedure and criteria shown in Appendix C.

(g) When an IWTO Certificate is to be issued which includes the Standard Deviation, the instrument must be calibrated prior to use, using snippets cut and prepared from Interwoollabs IH Standard Tops^(footnote 1) by using the same method normally used for preparing test specimens of Top Sliver. The calibration shall be verified using the procedure and criteria shown in Appendix C.

(h) ~~(g)~~ Each prepared slide must be measured on a setting of either "wholeslide x 1" or "wholeslide x 2" with the requirement that at least 2,000 fibre snippets are measured.

(i) ~~(h)~~ The measuring system shall minimise the acceptance of multiple measurements on a single fibre snippet.

7.1 Report on Individual Tests

Additional information may include:

(a) The standard deviation of fibre diameter in micrometres to one decimal place *if measured using the Calibration for Top Sliver.*

(b) The coefficient of variation of fibre diameter as a percentage to the nearest whole number *if the measurements of MFD and SD were made using the appropriate calibrations as outlined in Clause 5.*

(c) The distribution of fibre diameter as a frequency table or histogram with data grouped into appropriate classes *if measured using the Calibration for Top Sliver.*