



Testing Mean Fibre Diameter using Laserscan



Who Are Wool Testing Authority Europe Ltd?

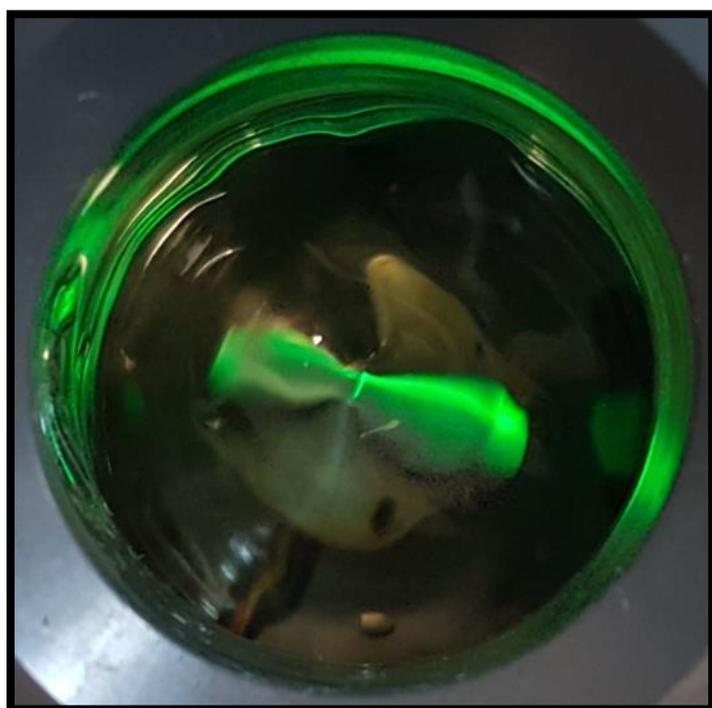
Wool Testing Authority Europe Ltd (WTAE Ltd) believe we must be the best at what we do. This belief means that we always strive to be the best. We set the standard! This passion and drive provide support to our customers so they can be the best at what *they* do.

WTAE Ltd has been providing impartial testing services to the wool industry for over a decade. Set up in 2004, we provide certificates of quality across the UK and Europe. We do this by only using test methods approved by the International Wool & Textile Organisation, (the IWTO). We also hold accreditation to the international quality standard ISO 17025 which assesses our competence as a testing laboratory. Our competence is evaluated annually by the United Kingdom Accreditation Service (UKAS). We also take part in round trials with other test houses worldwide for a range of IWTO test methods, which aims to harmonise test results issued all around the world. This gives the added assurance that the test results we produce are accurate and that this accuracy is reproducible time and time again.

Not only do we claim to be the best, we have the paperwork to prove it.

Mean Fibre Diameter and Laserscan.

Fibre fineness is one of the most important parameters of any animal fibre. It determines how the fibre will be used and affects the handle and visual appearance of the overall product. Clear price differentials exist for different fibre diameter, and in almost all the price increases as the diameter decreases.



The measurement unit of fineness is the micron. A micron is one millionth of a meter and is represented with the symbol; μm .

There are a multitude of methods for determining the MFD of a fibre. Before the advent of the current technologies, MFD was assessed by simply examining the fibre and making a subjective assessment. By today's standard this seems a rather primitive method, however these assessments could be surprisingly accurate. Today, three main methods are in use; airflow, Optical Fibre Diameter Analysis (OFDA), and laserscan. WTAE Ltd issue test results for all three methods but the focus of this leaflet will be on laserscan.

A test sample is scoured and conditioned. Snippets of the sample are then obtained either using a guillotine or a minicorer and dropped into the receiving fluid. The snippets are then dispersed throughout the fluid after which they pass into the

measurement cell containing an array of lasers. Each fibre snippet casts a shadow (or occlusion) across the laser beam, and it is through this interruption of the laser beam that MFD can be determined.

The Importance of an Accurate Test Method.

A test result is only as good as the test method used to produce it, which is why WTAE will only use IWTO test methods when testing animal fibres.

The samples are scoured in specially designed scouring bowls to ensure a thorough scouring cycle with zero fibre loss. After scouring, samples are dried to 0 % regain using dryers set at the standardised drying temperature for animal fibres (105 °C; ± 2.0 °C). Stringent quality control checks are performed daily by our highly trained testing technicians to ensure that all conditions meet these requirements.

Once scoured, all samples are conditioned prior to testing for MFD in our conditioning laboratory, controlled to the requirements of IWTO-52; Conditioning Procedures for Testing Textiles. The universally recognized atmosphere for testing animal fibres is 20 °C and 65 % RH and the conditioning laboratory is continually monitored using automated hydro logging systems and is mapped annually to ensure that the entire volume of the room meets these requirements. Daily quality control checks are carried out by our testing technicians before testing commences for that day.

Sufficient conditioning is crucial. Animal fibres will absorb and release moisture readily and can affect the overall MFD by up to 1 µm. A thoroughly scoured, completely dry sample is placed in the conditioning laboratory and allowed to reach equilibrium with the atmosphere for at least 5 hours before it is analysed on the laserscan machines.



Next is the testing process itself; snippets are randomly removed from the test sample and read using the laserscan machines. WTAE calibrate and validate their laserscan machines every 6 months using the latest series of Interwoollab wool tops. The series consists of 8 wool tops each with an assigned micron value ranging from approximately 15.0 – 35.0 µm. The latest series of wool tops must be used, and the values are updated each time a new series is issued. These tops are used to generate a calibration equation which is then used to determine the MFD of an unknown sample presented to the laserscan. The calibration is validated using a different set of wool tops (these can be an older series of the Interwoollab tops). This validation stage simply acts as a check that the calibration is producing an accurate result. If the validation passes the criteria set out in IWTO-12, the calibration can be installed and used to issue test results.

A total of 4,000 snippets are read across two machines simultaneously. The readings from each machine should be the same. Throughout the testing process, internal quality control checks are performed by our

database which looks for excessive differences between the two laserscan machines. If differences are detected an automatic retest is issued and your sample will be tested again at no additional charge to you.

All readings are combined and the MFD (along with other information) calculated and issued to you in the form of a WTAE test report.

What Does a WTAE Test Report Show?

As well as the average MFD result across the 4,000 snippets, a histogram will be displayed showing the spread of the data. Coefficient of variation, standard deviation and comfort factor are also reported.

Coefficient of Variation

This is an expression of the variation in the diameter of the sample. The smaller this value the more uniform the diameter. In short, the smaller the better. The following test is used as an example for the CV calculation.

The calculation for Coefficient of Variation is as follows:

$$\text{Coefficient of Variation (CV)} = (\text{SD} / \text{MFD}) \times 100$$

$$(6.10 \mu\text{m} / 30.9 \mu\text{m}) \times 100 = 19.7 \%$$

Standard Deviation

Standard deviation is a statistical term for the computed measure of variability indicating the spread of data set around the mean.

The standard deviation provides a measure of the dispersion, or variation, within the data set. In a normal frequency distribution, 68% of all values fall within 1 standard deviation from the mean, 95% of all values fall within 2 standard deviations from the mean, and 99% of all values fall with 3 standard deviations from the mean.

The Standard Deviation (SD) is calculated as follows:

$$\text{SD} = (\text{CV} \times \text{average MFD}) / 100$$

$$19.7 \times 30.9\mu\text{m} / 100 = 6.10 \mu\text{m}$$

Therefore; 68 % of the data falls within $\pm 6.10 \mu\text{m}$ of $30.9 \mu\text{m}$. As with coefficient of variation, the smaller the value the more uniform the MFD of the sample.

Comfort Factor

Comfort Factor is simply the number of fibres that measure greater than $30.0 \mu\text{m}$. Research has shown that the critical level of comfort in wool is $30.0 \mu\text{m}$. Typically, if more than 5 % of the fibres are greater than $30.0 \mu\text{m}$ the wool will be “prickly” against the skin.

For test sample that measures 51.5 % of fibres greater than $30.0 \mu\text{m}$, Comfort Factor (CF) is calculated as follows:

$$\text{CF} = 100 - (\% \text{ fibres} > 30.0 \mu\text{m})$$

$$100 - 51.5\%$$

$$\text{CF} = 48.50\%$$

All WTAE test reports also contain the following standard information:

- a letterhead detailing WTAE’s contact details and logo;
- a brand – the identifier of the sample provided by the customer;
- a report identifier – in the form of a unique test number;
- the test method used to produce the result with the required number of decimal places for reporting;
- a unique report verification code shown at the bottom of the test report;
- the National Accreditation Symbol confirming all test results were produced in accordance with test methods stated on WTAE’s UKAS accreditation schedule; www.ukas.org.

A typical report is displayed below:

Wool Testing Authority Europe
Unit 7, Cibyn Industrial Estate
Caernarfon
Gwynedd LL55 2BD
United Kingdom
Tel: +44 (0) 1286 678097
Fax: +44 (0) 1286 678039
Email: info@wtaeurope.com
www.wtaeurope.com

ALPACA TEST CERTIFICATE

Date 27 Aug 2019
Brand: **Laserscan**
EXAMPLE
Alpaca Fleece
Test No 2-00230565.X4

Results :

Laserscan (IWTO 12)
Mean Fibre Diameter : 26.0 um Coefficient of Variation : 21.80 %
Standard Deviation : 5.70 um % Fibres > 30 um : 18.25 %

Laserscan Histogram

Count

Micros

For electronic verification go to <http://verify.wtaeurope.com> and enter the following code: **j7f-162-96z**

THIS TEST REPORT APPLIES ONLY TO THE SAMPLE TESTED. Except where the sample is drawn independently by WTA Europe Ltd, WTA Europe Ltd. makes no warranty, implied or otherwise, as to the source of the tested sample. The test results below are not certified due to the adoption of modified and/or non-standard procedures designed to provide THE CLIENT WITH GUIDANCE INFORMATION ONLY. Except where prohibited by law, no responsibility can be accepted by WTA Europe Ltd. for any claim which may arise from any person acting on the information contained herein.

Sampling.



Extensive research has shown that the most representative area of the animal for fleece testing is the mid-side. Customers are permitted to send in their own samples for alpaca testing which will give a representative result provided a mid-side sample is taken.

WTAE can also offer a sampling supervision service in the event of trade disputes or other need for an impartial sampling service. Please contact WTAE Ltd for more information.

Impartiality is at the core of our business values. Our sampling representatives are fully trained wool samplers and are aware of the importance of impartial sampling. Their training is reviewed periodically to ensure they are up to date with the latest sampling requirements.

Online Report Verification.

WTAE offers an online verification service which provides confirmation to report users that the details on the WTAE test report in your possession are correct. By entering the test number verification code and email address in the appropriate boxes, the report holder will receive a PDF copy of the report in return. This will enable a rapid comparison and verification that the documents you hold and the results in the WTAE database are the same.

Online Portal

WTAE operate a free online portal which allows customers access to any of their test results that have been issued. You can access the portal at any time and watch test results being generated “live” as tests complete in the laboratory. Customers are able to print their own test reports, access historical reports and access testing invoices at any time and location.

FURTHER INFORMATION

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