Textiles for Feedstock Identification Guidance Document

NIST Research-Grade Test Material [10279]

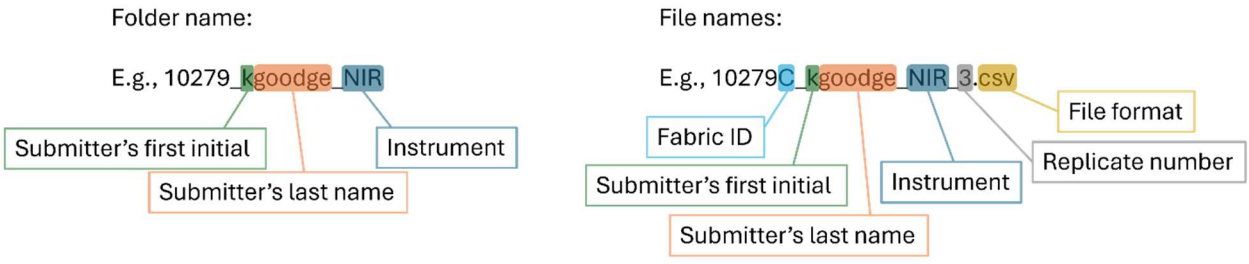
The material being provided is a NIST Research Grade Test Material (RGTM). This material is not a NIST Standard Reference Material® or a NIST Reference Material. NIST RGTMs are described in the latest edition of NIST Special Publication 260-136.

Purpose: NIST Research-Grade Test Material (RGTM) 10279 is being provided on a collaborative basis for recipients to evaluate potential fitness for purpose as a reference material by textile sorters, quality control professionals, or similar. Intended for validating methods of identifying fibers based on their absorbance or reflectance spectra in the near infrared region with potential for validating other methods of fiber identification. For more details, please visit our project page, linked here.

Description: A unit of RGTM 10279 consists of five (5) woven fabrics and one (1) 99 % reflectance calibration target. Each fabric is cut to 4 inches by 4 inches square and packaged as received from the supplier. The fiber content of the fabrics has been estimated by AATCC TM20A and anonymized for the purpose of the associated interlaboratory study, FIBRILS.

Period of Use: Recipient may use RGTM 10279 from receipt until the earlier of either completion of the recipient's participation in the RGTM interlaboratory study (FIBRILS) or the material's nominal expiration date, 01 March 2028.

Reporting of Results: Your feedback regarding use of this RGTM set will help us further test, develop, and improve these materials for future development. Please return feedback, test results, and raw data via this Google Forms link no later than 01 August 2026. We request raw data files to be zipped into one folder per instrument. Files can be in the following formats: .txt, .csv, .tiff, or .xlsx and named following the convention:



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Document is unofficial in printed form.

If your raw data is in a different format or if you prefer to supply processed data instead, please email us at fibrils@nist.gov.

Safety: Not hazardous. No Hazardous or Toxic components at or above threshold limit values. This unit is not hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200).

Storage: Ambient temperature and pressure.

Instructions for Use:

There are three ways to be involved with the interlaboratory study, FIBRILS.

(1) Measure fabrics, report raw data AND report qualitative/quantitative fiber analysis
(2) Measure fabrics, report raw data AND report predictive model results
(3) Measure fabrics AND report predictive model results

By agreeing to participate in the ILS, you agree that your submitted feedback and results can be used in the subsequent ILS analysis (see Use of Submitted Data section below). You will be able to designate your choice of participation level in the Feedback Form. For more information on each of these options, please read the respective sections below. We are always happy to arrange a virtual meeting to discuss your individual concerns and how we can best work together.

To minimize the effect of moisture variability, please condition fabrics following ASTM D1776/D1776M-20 (2024). If you unable to maintain a temperature of $21\ °C\ \pm 2\ °C$ and relative humidity of $65\ \%\ \pm 5\ \%$ for a minimum of four (4) hours, please report the temperature and relative humidity measurements of your setup under the "Environmental conditions" question of the Feedback Form.

Measurements. To better understand the methods that are currently being deployed and/or developed for fiber identification, we are not prescribing a measurement protocol. Instead, please describe your protocol in the Feedback Form in as much detail as you are willing to provide.

Please have one operator measure each fabric with a minimum of three (3) replicates. Each replicate should be measured on nonoverlapping weft (horizontal) and warp (vertical) yarns such that each measurement is an independent sampling of the yarns, i.e., no two measurements contain the same set of yarns. For the purpose of FIBRILS, no front face or back face of fabric is designated. If you are measuring the fabric with a spectrometer, we request that you measure one layer of fabric with the 99 % calibration target placed behind the fabric, demonstrated below.

Figure 1: Example of single layer of fabric with 99 % reflectance calibration target. Here, the detector is below the fabric, so the calibration target is placed on top of the fabric.

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Spectrometer parameters to report in the Feedback Form:

- Instrument Name and Model Number, if applicable
- Instrument Supplier Name
- Sampling/sensor type and detector type (e.g., Near Infrared might be measured with an integrating sphere and InGaAs detector)
- Measurement range and interval, please specify units. (e.g., Near Infrared might be measured between 833 nm to 2500 nm with a step size of approx. 3.2 nm)
- Resolution, please specify units. (e.g., Near Infrared spectrometer might have resolution of 4.0 cm^-1)
- Y-values and units (e.g., Near Infrared might be collected as reflectance counts or % reflectance. If you have data in multiple formats (e.g., reflectance and absorbance), please include information for each format.)
- Number of scans (e.g., one sample on a Near Infrared spectrometer might be collected over 128 scans. If not applicable to your instrument, please type N/A.)
- Environmental Conditions. Please provide an approx. relative humidity and temperature of your space during measurement. If you are unsure or do not have that information available to you, please insert N/A.
- Misc. instrument information

If you are making measurements with method(s) other than a spectrometer, the Feedback Form provides an open-ended response. Please describe your method in as much detail as possible.

The 99 % reflectance calibration target is included for your use as an external reference. From the manufacturer's user guide: "Although the material is very durable, care should be taken to prevent contaminants such as finger oils from contacting the material's surface. Always wear clean gloves when handling." If you are using spectrometer(s) for any of your measurements, please measure the calibration target a minimum of three (3) replicates for each instrument. Either face can be measured; please remove the green tape from the front surface and wash with water and microfiber cloth before measurement. For either face, we recommend air-brushing the dry surface with a jet of clean dry air or nitrogen before measurement to ensure the surface is free from dust or other light debris. Please include the measured values in your .zip folder for that instrument.

Fiber content predictions. Akin to our nonprescriptive measurement protocol, we do not have a specified protocol for predicting the fiber content of each RGTM fabric. Please describe your identification analysis method in the Feedback Form. If you are using Machine Learning (ML) or Artificial Intelligence (AI) models to predict fiber content, please choose the type of algorithm you used for this study.

Parameters to report in the Feedback Form:

- Figures of Merit. What values do you use to evaluate your method(s)/model(s) performance? (e.g., accuracy, precision, recall, bias, F1 score, RMSE) Please briefly explain how you define these parameters in the context of your method/model. If you prefer not to answer or do not know, please say so.
- Prediction Uncertainty. Beyond figures of merit, how do you analyze the prediction reliability of your method(s)/model(s)? (e.g., resampling, analytical error propagation, error covariance matrix, confidence interval of prediction, probability of prediction) Please briefly explain how you define these parameters in the context of your method/model. If you prefer not to answer or do not know, please say so.
- Model Calibration. Do you use spectra from calibration target(s) to calibrate your model before use? This could be during training or as an additional step. Please briefly describe.

Use of Submitted Data:
When you agree to participate in the interlaboratory study, you have the option to designate your level of participation. Deliverables from FIBRILS include:

1. Interlaboratory Study report
We will analyze the participant feedback and results. If you designate that your data can be shared in aggregate form, your anonymized data will be included in this report, and you will be included as a participant in the report unless you have designated that you would like to remain anonymous.

2. Co-NIR-SORT dataset
We will curate a dataset of the community-gathered raw or processed data to publish on NIST's Public Data Repository on data.nist.gov. If you designate that your data can be shared publicly, your anonymized data will be included in this dataset, and you will be included as an author on the dataset unless you have designated that you would like to remain anonymous.

NIST Technical Contacts: Amanda Forster (Amanda.forster@nist.gov) and Katarina Goodge (Katarina.goodge@nist.gov)

Disclaimer: *Certain commercial equipment, instruments, or materials may be identified in this Information Sheet to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.*