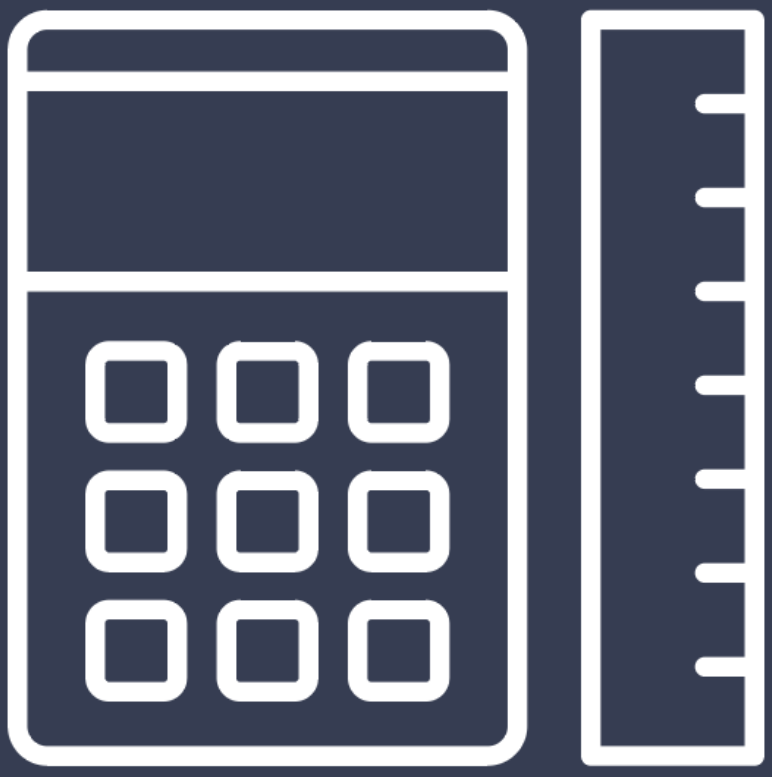
Textile Exchange | Materials Benchmark

Uptake Calculation Guide 2023



Contents

1 How to calculate your uptake data

Textile Exchange is seeking to increase the accuracy and comparability of raw material uptake calculations completed by brands and retailers and reported through its Materials Benchmark-SII Materials Portfolio[1].

We recognize that there are no mandatory requirements being imposed on brands and retailers' raw materials reporting and have presented an explanation of what can be considered best practice to support consistent and comparable data from all companies. The below table provides a summary of the recommended approach:

	Recommended Approach & Best Practice for Robust Industry Reporting
1. Date range	Calendar Year (January 1 – December 31).
2. Supply Chain Data Extraction	Product-Level (Actual quantity delivered to final destination country for sale "Placed on the Market"). More advanced options also available.
3. Products In-Scope	Brands – All major textile components of products produced. Retailers – All major textile components of own-line products produced. Suppliers - All major textile components of products produced.
4. Materials In-Scope	All textile raw materials used as basis of uptake calculations (conventional and non-conventional).
5. Product Weights	Actual product weight for each unique Style:Color combination (e.g. average of minimum and maximum weight)
6. Estimating Fiber Losses in Production	Use loss factors when converting product or fabric volumes back to fiber input. Uptake calculations should include fiber loss estimations in production and, ultimately, estimate the input at raw materials level.
7. Product Integrity System	Establish a product integrity system to collect necessary information to validate sourcing of more sustainable raw materials.
8. Metadata Form	Develop in-house methodology document for calculating raw materials uptake and submit in Metadata Form.

1.1 Date Range

To maximize the potential for comparability and aggregation of company reporting volumes in developing industry totals, calendar year-based reporting is identified as best practice (i.e. January 1 to December 31). Further, it is essential that each company uses consistent date ranges to ensure comparability between years and demonstrated growth. Selection of this date range could increase consistency and comparability of brand and retailer reporting, as well as allow Textile Exchange to explore how to better match "demand" data reflecting sourced raw materials volumes against actual raw material production worldwide.

[1] *This guidance was originally developed in 2019 in cooperation with the Partnership for Sustainable Textiles (textilbuendnis.com), the Waste & Resources Action Programme's (WRAP) Sustainable Clothing Action Plan (wrap.org.uk/sustainable-textiles/scap) and the Global Organic Textile Standard (global-standard.org/).*

1.2 Supply Chain Data Extraction

Textile Exchange encourages brands and retailers to use product-level delivered volumes as a basis for their calculations, (actual quantity delivered to final destination country for sale "Placed on the Market"). The benefits of this, including the ability for brands to convert styles from more sustainable to conventional in the event of insufficient evidence, outweigh the potential benefit/risk of identification of data from mill-level. For more engaged companies with robust checks and balances to validate data from mills, Textile Exchange is happy to continue receiving this data, and may explore a potential case study with one of these organizations for future iterations of this guide.

1.3 Products in scope

We would encourage companies to seek out robust data to most accurately model the complete raw material uptake of the company. We will ask for the company to state which products are out-of-scope when submitting data (e.g., licensed footwear is excluded from the calculation). We recommend using "Ship To" destination country/region for sale extracts from ERP systems or Logistics teams.

1.4 Materials in scope

In line with the above position on product types, Textile Exchange encourages participants to collect information on all textile raw materials in a company's portfolio – even if some are not currently part of reporting requirements for initiatives. We ask for uptake volumes for each unique material type including conventional raw materials, which can be derived from product composition data.

The Materials Benchmark asks for raw materials uptake volumes for each unique material type, including conventional materials. This will ensure increased visibility of raw materials sourcing portfolios and provide data to support the future integration of additional non-conventional raw materials. Furthermore, it should minimize potential misunderstandings in reporting data, decreasing the frequency of corrections requested to data already reported. It is worth noting that trims, embellishment, and labelling are not traditionally included in the calculations, however companies are invited to include this if they wish.

1.5 Product Weight

Actual weights for unique styles are ideal (data from product lifecycle management system (PLM) or from logistics teams). The next best option is using average weights derived from actual products from your company. If neither of those methods are available, the use of industry-wide average weight tables is accepted.

We advise using actual product weights. Individual stock keeping unit (SKU) are recommended to identify Style: Color instead of only Style as different colorways of the same style tend to have different fabrics (and respectively different compositions) and, therefore, different weights.

While Textile Exchange would encourage companies to identify their own actual product weights or derive average weights by silhouette based upon actual product, some brands and retailers may choose to use a generic product weight table; in that case, please see the BCI product weight table, Home Textiles and the WRAP product weight table.

It is worth reemphasizing that BCI weights include cutting waste losses (therefore no additional loss calculation should be applied from fabric to product), while WRAP/ECAP weights do not include this (therefore loss calculations should include cutting waste from fabric to product).

2 Estimating Fiber Loss in Production

It is critical to estimate the fiber losses in production of products, as nearly every supply chain stage has some raw materials remaining that is not embedded in the final product (e.g., cutting waste from cutting fabric for finished products). There is significant variability in terms of how brands and retailers are estimating fiber losses throughout the supply chain to calculate back to the uptake of raw material (e.g., for cotton, back to equivalent weight of cotton lint).

We have developed the **Textile Exchange Fiber Loss Calculator** for companies to use to calculate back to fiber level from either product or fabric and shows recommended fiber loss values known as "**conversion rates**". This calculator is a web-based tool for companies to use to easily apply these conversion factors.

It is worth noting that, if companies have access to fiber loss data, (for example, pattern efficiency data for their products) and are confident that these reflect reality, Textile Exchange would encourage companies to use this data for their calculations. If this is not available, another advanced reporting option is to differentiate sub-total weights for different fabric types as these tend to have distinctly different efficiencies (e.g., knits, woven, denims, etc.), see Advanced calculations.

2.1 Processing loss

Processing loss refers to the rate of loss attributed to the processing of one or more activities. For example, processing loss for "spinning – OE" denotes the rate of loss that occurs for open end spinning when fiber is made into yarn. Spinning/yarn types and acronyms used:

- OE – Open-end/Rotor
- K – Ring (carded yarn)
- C – Ring (combed yarn)
- CK – Ring (combed compact yarn)
- DTY – Drawn textured yarn

To calculate this processing loss, Textile Exchange refers to the **conversion rates** between an input in one tier of the supply chain and an output in another tier of the supply chain. For example, the yarn-to-fiber conversion rate 1.17 denotes the conversion of "1 yarn: 1.17 fiber". Put simply, 1.17 units of fiber are required to produce 1 unit of yarn. (Full details can be found in the Fiber Conversion Options).

2.2 Raw Materials

The conversion rates cover cotton (applicable for the other plant-based raw materials) and recycled cotton, polyester (applicable for all the other synthetic raw materials) and recycled polyester, nylon and recycled nylon, manmade cellulosics and "recycled" cellulosic, and wool (applicable for all the other animal-based raw materials).

Unlike cotton, where one fiber conversion rate is developed for virgin and another is developed for recycled, a single fiber conversion rate covering both virgin and recycled has been developed for polyester, nylon and manmade cellulosics. This approach has been taken because the processing variation between virgin and recycled polyester, nylon and manmade cellulosics predominantly occurs pre-fiber. As no significant variation occurs post-fiber, the conversion rate for both virgin and recycled is treated as the same.

Down and recycled down have been excluded because down uptake volumes (in grams) are generally collected at "material" level. Further, footwear, fully fashioned knitted non-wool

products, hemp, leather (in pilot), recycled wool and silk are not currently covered but will be considered for research and inclusion in subsequent updates.

Companies reporting on recycled wool and recycled down requiring conversions are requested to use the virgin conversion rates as equivalent proxies.

2.3 Supply Chain Tiers

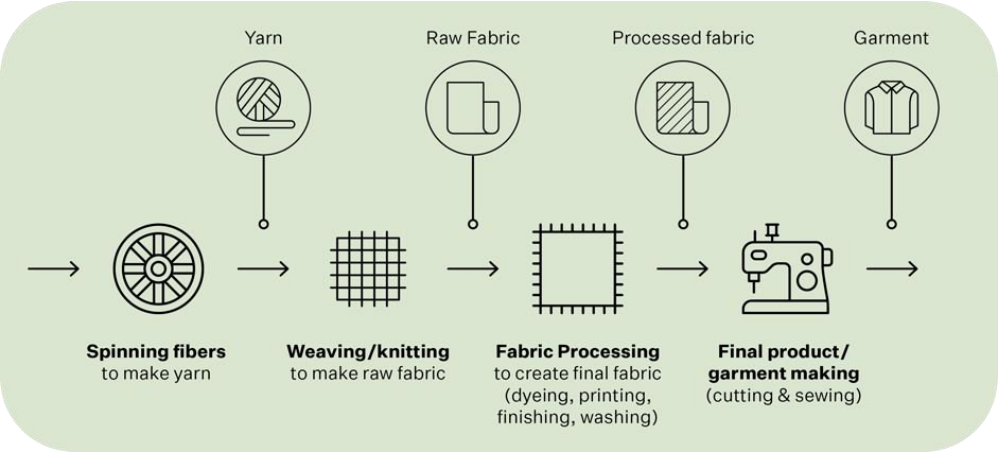
For each raw material category, three inputs (product, fabric, and yarn) are considered for conversion back to fiber as they are the most common method of tracking the use of raw materials. The textile supply chain can be highly complex. For purpose of standardization, only selected processes that are common across all raw materials and significant to the overall conversion rate have been considered in the methodology.

Across the cotton supply chain, these are identified as spinning, knitting/weaving, fabric processing (including dyeing and finishing) and cut, make, trim (CMT).

The same approach is applied across the other raw materials except for wool which includes scouring and/or top making within the yarn-to-fiber conversion.

In summary, each of the inputs are defined as follows:

- **Product**: refers to the final manufactured good where all stages of processing have been completed and is ready for sale.
- **Fabric**: refers to the finished fabric where all stages of processing have been completed (e.g., dyeing and finishing) and is ready for cut, make and trim.



- **Yarn**: refers to the finished yarn which is ready to be knitted or woven into fabric. In the case of polyester and manmade cellulosics, yarn includes both Drawn Textured Yarn (DTY) as well as staple yarn. For wool it refers to yarn that has been scoured, top made and/or spun.
- **Fiber**: is the baseline measure used in this methodology to track the uptake of conventional and non-conventional raw materials. For cotton it refers to ginned cotton - sometimes referred to as lint cotton. For polyester and manmade cellulosics it covers both filament and staple fiber. For wool, it refers to greasy wool.

2.4 Review & Update

The Processing loss Methodology has not been updated since 2019. Based on our understanding, the conversion rates we use are the most accurate model in the industry. We welcome data from any industry stakeholder to continuously improve the modelling of conversion rates. Textile Exchange will consult with members during regular reviews to determine if expansion of the methodology to include additional product-types or materials would be beneficial to the textile industry.

2.5 Limitations and Constraints

Textile Exchange's processing loss is intended as a tool to support companies to estimate their product, fabric, and yarn uptake back to a fiber baseline measure. Where possible, companies are encouraged to apply their own conversion rates. The Textile Exchange suite of fiber conversion rates are offered only as standardized approximations of conversions with the following limitations:

- **Data Sets:** Certification bodies, suppliers and brands/retailers are asked to volunteer either an average or a range of conversion values for product-to-fabric, fabric-to-yarn, and yarn-to-fiber, taking into consideration the key processes involved. The values reported are assumed true and accurate. Furthermore, due to the time and resource limitations, data is sourced from companies who are open and able to volunteer this information.
- **Processes**: Whilst specific and significant processes have been accounted for in the calculation of conversion rates, it is acknowledged that they are not a complete representation of all the processes that can occur. Furthermore, conversion rates reported by data sources may be solely for a specific processing and/or inclusive of other processes that is common in their practice between input and output.
- **Region, Country, Product Variation**: Conversion rates may differ significantly from country to country, producer to producer and even product to product. Attempts were made to gather from sources across different regions and stakeholders, but it is acknowledged that these sources may not be complete, and averages have not been weighted against the share of these markets and/or products.

3 Product Integrity System

Textile Exchange encourages companies to establish a product integrity system to collect necessary information to validate conventional/non-conventional raw materials sourcing. We advise collecting information as products are produced so that evidence is available to support more sustainable sourcing claims when products are placed on the market. This proactive approach is preferable to collecting evidence when putting together annual raw materials uptake calculations.

4 Metadata

In the Materials Portfolio of the Materials Benchmark there is a "Metadata Form". This is designed to support brands in pulling comparable data year-on-year but will also give Textile Exchange visibility into the scope of each company's data submission, aiding the aggregation of fiber data to best represent industry totals. We recommend you upload your calculations (question MP-5-8).

5 Approach and Considerations

5.1 Data Sources

In 2019, over 50 data sets were collected from certification bodies, suppliers, manufacturers, and brands for the development of the fiber conversion rates. Data sets collected may comprise a single data point (e.g. recycled polyester fiber to filament) or may be vertically complete (e.g. organic cotton fiber to apparel). Additionally, discussions and email exchanges were had with certification bodies, suppliers, manufacturers, and brands. Due to increasing appeal from companies for harmonization, numerous consultations were held with the Better Cotton Initiative to align on cotton conversion rates.

5.2 Development Steps

Step 1 - **Develop approach:** Set out the scope and boundaries, outlined the conversion options and identified the engagement required for data gaps.

Step 2 - **Collect data:** Reached out to certification bodies, suppliers, manufacturers, and brands for data sets. Data points were also extracted from past benchmarking surveys for triangulation and cross reference.

Step 3 - **Analyze data:** The data sets were analyzed on range, average, median and mode. As it was not possible to establish sample size that is reflective of the market share, median (as opposed to average data points) were applied.

Step 4 - **Adjustments**: Following the initial analysis, discussions were held internally with textile engineers and externally with initiatives (e.g. Better Cotton Initiative). For a more consistent "sector wide" approach, some data points were aligned between organizations following these discussions.

Step 5 - **Advisory Committee:** The "final" conversion methodology was presented to the Advisory Committee and other stakeholders for comments and feedback.

6 Development Approach

6.1 Dependencies

There are inherent dependencies between the fiber characteristics, how it is processed and the final product. In developing conversion rates from product, fabric and yarn to fiber, these dependencies need to be accounted for. The table below provides a broad overview of these dependencies - fiber length determines the type of yarn that can be spun, yarn type determines whether it is suited for knit or woven fabric, which will in turn determine the type of products for which it is suited.

Table 2: Cotton Profile and Product Suitability

Cotton	Fiber Length	Yarn Count (Ne)	Yarn Type	Cultivation Country (Organic)	Product Suitability	Broad Classification
Gossypium Arboreum	Short	3–20	OE, K	Benin, Bukian Faso, India, Mali, Pakistan, Peru, Senegal, Tanzania, Uganda, USA	Denim/Jeans, Home, Canvas, Non-Wovens, Medical, Industrial textiles	Home Textile / Apparel Woven / Denim
Gossypium Herbaceum	Short	3–20	OE, K	Benin, Bukian Faso, India, Mali, Pakistan, Peru, Senegal, Tanzania, Uganda	Denim/Jeans, Home, Canvas, Non-Wovens, Medical, Industrial textiles	
Gossypium Hirsutum (Upland)	Medium, Long	18–45	K, C, CK	Benin, Brazil, Bukina Faso, China, Colombia, India, Madagascar, Mali, Pakistatn, Peru, Senegal, Tajikistan, Tanzania, Turkey, Uganda, USA	Denim/Jeans, Home, T shirts, Yoga wear, Leisure wear, Causal wear, Under wear, Industrial, Smart, Geo textiles	Apparel Knitted / Woven (Less)
Gossypium Barbadense	Long, Extra Long	40–130	K, C, CK	China, Egypt, India, Israel, Kyrgyzstan, Madagascar, Peru, Turkey, USA	High-end (fine apparel, underwear/intimates), High-end Home	

OE - Open end/Rotor yarn | K - Ring spun carded yarn | C - Ring spun combed yarn | CK - Ring spun combed compact yarn

Source: Organic Cotton: A Fiber Classification Guide

It is worth noting that the more information a brand has on their supply chain, the more accurate the estimated conversion calculation can be. For example, being able to differentiate between knit or woven fabric, or spinning type used in production would allow for a more nuanced calculation and would give companies the ability to estimate raw material uptake more accurately.

6.2 Assumptions

Balancing the need for accuracy with the availability of data and taking into consideration that broadly speaking:

- At the very least, companies can specify whether the uptake is used for apparel or home textiles.
- For cotton, open end (OE) and carded (K) yarn is commonly used for home textiles, woven apparel, and denim products, and carded (K) and combed (CK) yarn is commonly used for knitted apparel and, to a lesser extent, woven apparel.
- For polyester and manmade cellulosics, filament is commonly used for home textiles, woven apparel and denim products, and staple yarn is commonly used for knitted apparel and, to a lesser extent, woven apparel.
- For wool, woolen-spun yarn is commonly used for home textiles and apparel products (such as jersey and knitwear), and worsted yarn is commonly used for apparel (such as tailored garments and suits).

- Processing loss for cut, make and trim (CMT) is similar between cotton, polyester, polyamide, and manmade cellulosic products but not for wool products due to the way the garment is manufactured.

7 Reporting Leather uptake volumes

Benchmark participants are encouraged to report their leather uptake. Leather should be reported in the Materials Portfolio as surface area of finished leather or weight of raw hide. If unable to identify this data, the Textile Exchange Uptake Calculator Spreadsheet is available to support if the conversion from product to surface area of finished leather is required.

If the absolute volume for a program or conventional material used cannot be reported, please estimate the share of the program or conventional material in relation to the overall leather portfolio for the system to proximate uptake. Please note that the system can only proximate uptake when there is an absolute volume reported for at least one program.

All consumption entries are reverted to mass of raw hide. A default conversion factor of finished leather area to raw hide mass is integrated in Leather's uptake data table and the conversion will be made automatically for the user.

The finished leather area to mass of raw hide default factor of 0.00633 is based on the conversion factors provided by the EU Environmental Footprint Category Rules for Leather and has been calculated, taking into account all leather industry segments, species, and product types. (1 m2 of finished leather = 0.00633 mt of raw hide or 1 mt of raw hide = 157.98 m2 or finished leather.)

Appendices

Appendix A: Basic Calculation

Below is an example fiber uptake calculation, based on product-level data. This is a "basic" calculation as the method for estimating fiber weights uses a basic ratio for every material type. Different types of fabric and product have different efficiencies, and therefore, a more advanced and more accurate calculation methodology is also available.

Step 1: Identify volume data for desired date range:

Data source likely to be ERP system, or logistics databases

Date	Ship-To	Customer Number	Style & Color	Quantity
1/1/18	DE	123	111111-001	100,000
8/24/18	FR	456	222222-500	300,000
12/31/18	NL	789	333333-901	500,000

Step 2: Identify composition of unique products (likely that this is a Style & Color code):

Data source likely to be PLM system or product labeling teams.

Style & Color	Gender Age	Category	Silhouette	Composition
111111-001	Menswear	Tops	Polo Shirt	88% Polyester, 12% Elastane
222222-500	Womenswear	Bottoms	Jeans	100% Cotton
333333-901	Babywear	All-In-One	Sleepsuit	95% Cotton, 5% Elastane

Step 3: Identify product weights:

Data source likely to be PLM system or logistics.

Style & Color	Min Weight (g)	Max Weight (g)	Average Weight (kg)
111111-001	350	450	0.4
222222-500	350	650	0.5
333333-901	75	275	0.175

Step 4: Merge datasets, calculate weight of fiber uptake at product-level

Date	Style - Color	Quantity	Average Weight (kg)	Fiber 1	%	Weight Fiber 1 (kg)	Fiber 2	%	Weight Fiber 2 (kg)
1/1/18	111111-001	100,000	0.4	88%	Polyester	35,200	12%	Elastane	4,800
8/24/18	222222-500	300,000	0.5	100%	Cotton	150,000	0%		
12/31/18	333333-901	500,000	0.175	95%	Cotton	83,125	5%	Elastane	4,375

Fiber Sub-Totals at Product-Level (in kg)	
Cotton	233,125
Elastane	9,175
Polyester	35,200

Step 5: Integrate PFM criteria if not embedded in composition information:

Style 222222-500 is confirmed to be completely made of certified Organic Cotton (100% cotton composition) by validating the scope and transaction certificates. Therefore, the 150,000kg of cotton are classified as Organic Cotton.

Fiber	Weight at Product Level (in Kilograms)
Conventional Cotton	83,125
Organic Cotton	150,000
Elastane	9,175
Polyester	35,200

Step 6: Apply fiber loss values (or conversion rates) to estimate the raw fiber input (for non-SCAP calculations)

In the below example, the brand has identified specific conversion rates for their products. Please skip this step if only submitting to SCAP as these conversion rates are embedded within the SCAP tool. Please see Estimating Fiber Loss in Production if you need support identifying fiber loss values for your calculation.

Fiber	Weight at Product Level (in KG)	Conversion Rate – Product to Fiber	Weight at Fiber Level (in KG)
Conventional Cotton	83,125	1.63	135,493.75
Organic Cotton	150,000	1.63	244,500
Elastane	9,175	1.5	13,762.5
Polyester	35,200	1.4	49,280

Appendix B: Advanced Calculations

Below is an example fiber uptake calculation, based on product-level data. This is an "advanced" calculation example as the method for estimating fiber weights specifies sub-totals for types of fabric and some types of products. If level of detail is not available for this year's calculation, please see the basic example for uptake calculation.

Step 1: Identify volume data for desired date range:

- Data source likely to be ERP system, or logistics databases

Date	Ship-To	Customer Number	Style & Color	Quantity
1/1/18	DE	123	111111-001	100,000
8/24/18	FR	456	222222-500	300,000
12/31/18	NL	789	333333-901	500,000

Step 2: Identify composition of unique products (likely that this is a Style & Color code). Also, identify the Fabric Type (this will be used for the fiber loss calculation)

- Data source likely to be PLM system or product labeling teams.

Style & Color	Gender Age	Category	Silhouette	Composition	Fabric Type
111111-001	Menswear	Tops	Polo Shirt	88% Polyester, 12% Elastane	Woven
222222-500	Womenswear	Bottoms	Jeans	100% Cotton	Denim
333333-901	Babywear	All-In-One	Sleepsuit	95% Cotton, 5% Elastane	Knit

Step 3: Identify product weights

- Data source likely to be PLM system or logistics.

Style & Color	Min Weight (g)	Max Weight (g)	Average Weight (kg)
111111-001	350	450	0.4
222222-500	350	650	0.5
333333-901	75	275	0.175

Step 4: Merge datasets, calculate weight of fiber uptake by fabric type at product-level

Date	Style & Color	Quantity	Average Weight (kg)	Fiber 1	%	Weight Fiber 1 (kg)	Fiber 2	%	Weight Fiber 2 (kg)
1/1/18	111111-001	100,000	0.4	Polyester	88%	35,200	Elastane	12%	4,800
8/24/18	222222-500	300,000	0.5	Cotton	100%	150,000		0%	
12/31/18	333333-901	500,000	0.175	Cotton	95%	83,125	Elastane	5%	4,375

Fiber Sub-Totals by Fabric Type at Product-Level (in kg)		
Knit	Cotton	83,125
	Elastane	4,375
Denim	Cotton	150,000
Woven	Elastane	4,800
	Polyester	35,200

Step 5: Integrate PFM criteria if not embedded in composition information:

Style 222222-50 is confirmed to be completely made of certified Organic Cotton (100% cotton composition) by validating the scope and transaction certificates. Therefore, the 150,000kg of cotton are classified as Organic Cotton.

Fiber Sub-Totals by Fabric Type at Product-Level (in kg)		
Knit	Cotton	83,125
	Elastane	4,375
Denim	Organic Cotton	150,000
Woven	Elastane	4,800
	Polyester	35,200

Step 6: Apply fiber loss values (or conversion rates) to estimate the raw fiber input

In the below example, the brand has identified specific conversion rates for the fabric types of their products. Please skip this step if only submitting to SCAP as these conversion rates are embedded within the SCAP tool. Please see Estimating Fiber Loss in Production if you need support identifying fiber loss values for your calculation.

Fiber Sub-Totals by Fabric Type at Product-Level (in kg)			Fiber Loss Rates	Fiber Sub-Totals at Fiber Level (in kg)
Knit	Cotton	83,125	1.65	137,156.25
	Elastane	4,375	1.50	6,562.50
Denim	Organic Cotton	150,000	1.35	202,500.00
Woven	Elastane	4,800	1.60	7,680.00
	Polyester	35,200	1.70	59,840.00

Fiber	Total at Fiber Level (in kg)
Cotton	137,156.25
Elastane	14,242.50
Organic Cotton	202,500.00
Polyester	59,840.00

Appendix C: WRAP Product Weight Table, Apparel

If using the WRAP product weights, it is mandatory to cite them as the source. Please use the below attribution:

"This Data is provided by The Waste and Resources Action Programme (WRAP), whose mission is to accelerate the move to a sustainable and resource-efficient economy."

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Womenswear			
Dressing Gowns Heavy Weight	1080	Dressing Gowns (Toweling)	1500
Dressing Gowns Light Weight	306		
Pajamas Light Weight	371		
Pajamas Heavy Weight	452		
Jersey Nightwear	344	Nightwear	150
Knickers/Pants	29	Knickers/Pants	45
Bras - Padded Underwired	112		
Bras - Lace Underwired	80		
Bras - Non-wired	39		
Slips	112		
Swimsuit	146		
Bikini Top	64		
Bikini Briefs	59		
Tankini Top	71		
Tankini Briefs	53		
Socks	31	Socks	31
Tights 15 Denier	24		
Tights 40 Denier	36		
Tights 60 Denier	43		
Heavy Tights	73		
Winter Vest (Thermal)	109		
Vests Jersey Cami	95	Underwear Vests	90
Thick Strap Vests	120		
Knitwear Heavy Weight	402	Knitwear	375
Knitwear Summer Weight	159		
Knitwear Light Knit	226		
Knit Formal Top	296		
Hoody	489		
Sweat Tops / Rugby Tops	432	Sweat Tops / Rugby Tops	420
Sweat Jacket	495		

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Tee Shirt Long Sleeve	176	Tee Shirt	190
Tee Shirt Short Sleeve	140		
Woven Formal / Casual Shirt Long Sleeve	130	Woven Formal / Casual Shirt	135
Woven Formal / Casual Shirt Short Sleeve	130		
Winter Heavyweight Coat (Main Fabric Only)	1056	Jacket	420
Winter Heavyweight Coat (Lining)	200		
Winter Raincoat / Mac (Main Fabric Only)	1052		
Winter Raincoat / Mac (Lining)	200		
Spring Mid Weight Coat (Main Fabric Only)	633		
Spring Mid Weight Coat (Lining)	200		
Lightweight Mac (Main Fabric Only)	362		
Lightweight Mac (Lining)	200		
Tailored Jacket (Main Fabric Only)	300		
Tailored Jacket (Lining Only)	100		
Waistcoat (Main Fabric Only)	150		
Waistcoat (Lining)	50		
Formal Suit Dress (Main Fabric Only)	350		
Formal Suit Dress (Main Fabric Only)	100		
Tailored Trousers	317		
Tailored Skirt	270		
Maxi Dress	433		
Standard Dress	263		
Knitted Dress	255		
Fleece Jacket	327		
Casual Jacket	653		
Casual Skirt	197	Skirt	115
Casual Trouser	364		
Cargo Trouser	243	Cargo Trouser	275
Jogger Pant	353	Jogger	420
Jean	478	Jean	560
Playsuit (Long)	228		

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Playsuit (Short)	214		
Leggings	130		
Menswear			
Dressing Gowns (Toweling, Velour, Fleece)	1127	Dressing Gowns (Toweling)	1600
Dressing Gowns (Lightweight)	536		
Knickers / Pants	77	Knickers / Pants	90
Fitted Boxer	75		
Loose Fit Boxer	63		
Brief	51		
Pajamas Heavyweight	493	Pajamas	300
Pajamas Lightweight	358		
Socks	36	Socks	35
Underwear Vests	103	Underwear Vests	110
Ties	36		
Suit Jacket (Main Fabric Only)	500		
Suit Jacket (Lining)	125		
Suit Trouser	402		
Jackets (Main Fabric Only)	500		
Jackets (Lining)	125		
Formal Trousers	350		
Heavy Weight Knitwear	650	Knitwear	500
Lightweight Knitwear	283		
Hoody	646		
Polo Shirt	229	Polo Shirt	370
Rugby Tops	442	Sweat Tops / Rugby Tops	470
Sweat Top	500		
Jogger	532	Jogger	500
Tee Shirt Long Sleeve	258	Tee Shirt	190
Tee Shirt Short Sleeve	266		
Swimwear Shorts	196		
Fleece Jacket	323		
Outerwear Jackets - Lightweight	701		
Outerwear Jackets – Lightweight Lining	150		
Outerwear Jackets - Midweight	927		
Outerwear Jackets - Midweight Lining	150		

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Outerwear Coats/Jackets - Heavyweight	1369		
Outerwear Coats/Jackets - Heavyweight Lining	150		
Woven Formal / Casual Shirt Short Sleeve	225	Woven Formal Shirt Poly Cotton (65%, 35%)	240
Woven Formal / Casual Shirt Long Sleeve	243	Woven Formal Shirt 100% Cotton	285
Casual Trouser	514	Casual Corduroy Trouser	630
		Casual Chino Trouser	485
Lightweight Shorts	164		
Casual Shorts	276	Casual Shorts	320
Jean	718	Jean	650
Babywear			
Bodysuits	85	Bodysuits	114
Sleepsuits	125		
Bib	24		
Blanket	194		
Sleeping Bag	228		
Dress	72		
Jogger	78		
Snowsuit	471		
Fleece Bodysuit	189		
Socks	13		
Younger Girls (1 to 7 years)			
Lightweight Jacket	182		
Coat Heavyweight Jacket	275		
Tee Shirt Short Sleeve	87	Tee Shirt	70
Tee Shirt Long Sleeve	96		
Vest	36		
Swimwear	50		
Jumper	120		
Jeans	207	Jean, Trouser, Jogger, Hoody	200
Trousers	213		
Joggers	177		
Hoody	218		
Sweatshirt / Hoody	242		
Dungarees	292		
Shorts	145		
Dress	106	Dress	84
Socks	15	Socks	13
Leggings	84	Leggings	97

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Skirts	90	Skirts	63
Older Girls (6 - 14 years)			
Socks	25	Socks	26
Skirts	133	Skirts	127
Shorts	139		
Jeans	321	Jean, Trouser, Jogger, Hoody	400
Trousers	311		
Joggers	209		
Hoody	345		
Tee Shirt Long Sleeve	123	Tee Shirt	140
Tee Shirt Short Sleeve	94		
Vest	67		
Sports Bra	20		
Pants	20		
Swimming Costume	65		
Bikini	53		
Tops	96		
Dress	161	Dress	169
Leggings	134	Leggings	194
Knitwear Heavy Weight	244		
Knitwear Light Weight	182		
Jacket Light Weight	172		
Heavy Weight Coats	723		
Younger Boys (1 to 7 years)			
Socks	15	Socks	15
Tee Shirt Long Sleeve	98	Tee Shirt	90
Tee Shirt Short Sleeve	109		
Polo	117		
Vest	36		
Swim Trunks	14		
Coat / Jacket	323		
Shorts	114		
Knitwear	220		
Jeans	219	Jean, Trouser, Jogger, Hoody	200
Trousers	193		
Joggers	202		
Hoody	245		
Woven Shirt	79	Woven Shirt	90
Sweat Tops / Rugby Tops	172	Sweat Tops / Rugby Tops	190
Older Boys (6 - 14 years)			

WRAP Item	Weight (grams) excl. cutting waste	BCI Silhouette	Weight (grams) incl. cutting waste
Socks	25	Socks	30
Tee Shirt Long Sleeve	146	Tee Shirt	180
Tee Shirt Short Sleeve	135		
Polo Shirt	160		
Vests	47		
Pants	25		
Swim Trunks	121		
Jeans	341	Jean, Trouser, Jogger, Hoody	400
Trousers	361		
Joggers	322		
Hoody	364		
Coat / Jacket	588		
Shorts	177		
Knitwear	323		
Woven Shirt	139	Woven Shirt	180
Sweat Tops / Rugby Tops	338	Sweat Tops / Rugby Tops	380
Schoolwear			
Socks	22	Socks	10
Skirts	187	Skirts	38
Shorts	150		
Joggers	355		
Coats	736		
Tee Shirt Long Sleeve	99	Tee Shirt, Blouses	63
Tee Shirt Short Sleeve	97		
Shirt Long Sleeve	128		
Shirt Short Sleeve	104		
Blouse	64		
Polo Shirt	114		
Dress	117	Dress	100
Trouser	218	Trouser	92
Knitwear Jumper	137	Knitwear	125
Knitwear Cardigan	145		

Appendix D: BCI Product Weight Table, Home Textiles

For these homeware products specifically, it is assumed that there is no cutting waste. Different weights are provided based upon approximate GSM or grams of fabric per square meter. To best match products to the average weight for each category of towels, the following average dimensions are used:

Face Cloth	31.5 cm x 31.5 cm
Guest Towels	65 cm x 40 cm
Hand Towels	95 cm x 50 cm
Bath Towel	130 cm x 70 cm
Bath Sheet	167 cm x 100 cm

Product Category	Products	Grams
Towels	Face Cloth 420 GSM	42
Towels	Face Cloth 500 GSM	50
Towels	Face Cloth 570 GSM	57
Towels	Face Cloth 640 GSM	64
Towels	Face Cloth 670 GSM	66
Towels	Face Cloth 800 GSM	79
Towels	Kitchen Tea Towel	100
Towels	Guest Towel 420 GSM	109
Towels	Guest Towel 500 GSM	130
Towels	Guest Towel 570 GSM	148
Towels	Guest Towel 640 GSM	166
Towels	Guest Towel 670 GSM	174
Towels	Guest Towel 800 GSM	380
Towels	Hand Towel 420 GSM	200
Towels	Hand Towel 500 GSM	238
Towels	Hand Towel 570 GSM	271
Towels	Hand Towel 640 GSM	304
Towels	Hand Towel 670 GSM	318
Towels	Hand Towel 800 GSM	380
Towels	Bath Towel 420 GSM	382
Towels	Bath Towel 500 GSM	455
Towels	Bath Towel 570 GSM	519
Towels	Bath Towel 640 GSM	582
Towels	Bath Towel 670 GSM	610
Towels	Bath Towel 800 GSM	728
Towels	Bath Sheet 420 GSM	701
Towels	Bath Sheet 500 GSM	835
Towels	Bath Sheet 570 GSM	952
Towels	Bath Sheet 640 GSM	1069
Towels	Bath Sheet 670 GSM	1119

Product Category	Products	Grams
Towels	Bath Sheet 800 GSM	1336
Bedding	Duvet / Quilt Cover (150 X 200 cm)	750
Bedding	Duvet / Quilt Cover (200 X 200 cm)	1000
Bedding	Duvet / Quilt Cover (240 X 220 cm)	1320
Bedding	Duvet / Quilt Cover (260 X 220 cm)	1430
Bedding	Fitted Sheet (135 x 190 x 20 cm)	500
Bedding	Fitted Sheet (140 x 200 x 20 cm)	540
Bedding	Fitted Sheet (160 x 200 x 20 cm)	600
Bedding	Fitted Sheet (180 x 200 x 20 cm)	660
Bedding	Fitted Sheet (200 x 200 x 20 cm)	720
Bedding	Fitted Sheet (90 x 200 x 20 cm)	420
Bedding	Flat Sheet (150 X 260 cm)	350
Bedding	Flat Sheet (180 X 260 cm)	420
Bedding	Flat Sheet (220 X 260 cm)	500
Bedding	Flat Sheet ET (240 X 260 cm)	560
Bedding	Flat Sheet (265 x 275 cm)	650
Bedding	Flat Sheet (280 x 290 cm)	730
Bedding	Duvet / Quilt (outer fabric) - 150 X 200 cm	630
Bedding	Duvet / Quilt (outer fabric) - 200 X 200 cm	840
Bedding	Duvet / Quilt (outer fabric) - 240 X 200 cm	1000
Bedding	Pillow (outer fabric)	150
Bedding	Pillowcase	150
Bedding	Valance Sheet (140 x 200 cm)	500
Curtains & Carpets	Bath Mat	483
Curtains & Carpets	Curtains 300 cm X 145 cm 600 GSM	2610

Appendix E: Conversion Options

The following fiber conversion rates are made available:

	Option 1 Where companies are unable to specify further details of the product.		Option 2 Where companies are able to specify further details of the product			
Products	Home Textiles	Apparel	Home Textiles	Denim	Apparel - Woven	Apparel - Knitted
Fabric processing	Mix	Mix	Mix		Mix	Mix
Knitting/weaving	Mix	Mix	Woven		Woven	Knitting
Yarn - Cotton	Mix	Mix	OE		OE, K	C, CK
Yarn - Polyester	Mix	Mix	Filament		Filament	Staple
Yarn - MMCF	Mix	Mix	Filament/Spun		Staple	Staple
Yarn - Wool	Mix	Mix	Woolen-Spun		Worsted	Worsted

Cotton Fiber Conversion rates (applicable for all the other plant-based raw materials)

	Option 1		Option 2			
Products	Home Textiles	Apparel	Home Textiles	Denim	Apparel - Woven	Apparel - Knit
Product-to-fiber	1.31	1.65	1.31		1.60	1.76
Fabric-to-fiber	1.25	1.32	1.25		1.28	1.41
Yarn-to-fiber	1.11	1.18	1.11		1.14	1.26

Recycled Cotton Fiber Conversion rates

	Option 1		Option 2			
Products	Home Textiles	Apparel	Home Textiles	Denim	Apparel - Woven	Apparel - Knit
Product-to-fiber	1.39	1.70	1.39		1.65	1.74
Fabric-to-fiber	1.32	1.36	1.32		1.32	1.40
Yarn-to-fiber	1.14	1.18	1.14		1.14	1.20

Polyester and Recycled Polyester Fiber Conversion rates (applicable for all the other synthetic raw materials)

	Option 1		Option 2		
Products	Home Textiles	Apparel	Home Textiles	Apparel - Woven	Apparel - Knit
Product-to-fiber	1.20	1.53	1.20	1.43	1.59
Fabric-to-fiber	1.14	1.22	1.14	1.14	1.27
Yarn-to-fiber	1.03	1.06	1.03	1.03	1.10

Nylon and Recycled Nylon Fiber Conversion rates

	Option 1		Option 2		
Products	Home Textiles	Apparel	Home Textiles	Apparel - Woven	Apparel - Knit
Product-to-fiber	1.20	1.53	1.20	1.43	1.59
Fabric-to-fiber	1.14	1.22	1.14	1.14	1.27
Yarn-to-fiber	1.03	1.06	1.03	1.03	1.10

Manmade Cellulosics and “Recycled” Cellulosic Fiber Conversion rates

	Option 1		Option 2		
Products	Home Textiles	Apparel	Home Textiles	Apparel - Woven	Apparel - Knit
Product-to-fiber	1.23	1.49	1.23	1.46	1.53
Fabric-to-fiber	1.17	1.19	1.17	1.17	1.22
Yarn-to-fiber	1.02	1.03	1.02	1.02	1.05

Wool Fiber Conversion rates (applicable for all the other animal-based fibers)

	Option 1		Option 2		
Products	Home Textiles	Apparel	Home Textiles	Apparel - Woolen	Apparel - Worsted
Product-to-fiber	2.37	2.13	2.37	2.49	1.84
Fabric-to-fiber	2.27	1.95	2.27	2.27	1.69
Yarn-to-fiber	2.16	1.85	2.16	2.16	1.60

Please note: All other raw materials, will have the following conversion factor applied as proxies: Plant-based fibers - conversion factor for CO, Synthetics conversion factor for PL, Animal based fibers – conversion factor for Wool. A proxy will be applied until accurate rates are developed. Prioritization of developing accurate conversion factors will be based on the increased uptake and use of the raw material.

Overview of Conversion Analysis

The following tables outline the conversion analysis carried out across all fiber categories following the approach previously specified in "Development Steps." Further notes on the analysis include:

- **Range**: The range include the minimum and maximum values collected irrespective of whether they are collected as a single value or a range of values (i.e. the range for 25, and 5 to 30 is considered as 5 to 30).
- **Outliers**: Outliers are values that lie outside of the data range collected (e.g. where data range is 5, 7, 2-10, 8 and 25, 25 would be considered as an outlier).
- **Average:** Averages are calculated across all values collected. Where a range of values is collected, the average of that range is considered as an input (e.g. average of 5, 2-10 is calculated as average (5, average (2,10)).
- **Median**: Medians are calculated across all values collected. Where a range of values is collected, the average of that range is considered as an input (e.g. median of 5, 2-10 is calculated as median (5, average (2,10)).
- **Adjustments:** In selected cases, based on discussions with external initiatives or internal engineers, adjustments are made to the calculated processing loss. These adjustments are either made for the purpose of industry alignment or in consideration of market conditions (i.e. apparel mix figures are derived from approximately 85% of the apparel market being knit and 15% woven). Similarly, Wool Apparel Mix is derived from approximately 50% woolen spun and 50% worsted.

Cotton Fiber Conversion Analysis

	Range	Outlier	Average	Median	Cotton Apparel Woven	Cotton Apparel Knit	Cotton Home/ Denim	Cotton Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	3 – 30	40	19.8	20	20	20	5	20
Finished fabric weight								
Fabric processing	1 – 14	–	8.5	9	9	9	9	9
Knitting/weaving	1 – 3	–	1.9	2	2	2	2	2
Yarn weight								
Spinning - OE	6 – 16	–	10.8	10	12.5		10	15
Spinning - K	10 – 20	–	14.1	13.8		20.4		
Spinning - C, CK	15 – 30	37	26.7	27.5				
Fiber weight								
Product-to-fiber factor					1.60	1.76	1.31	1.65
Fabric-to-fiber factor					1.28	1.41	1.25	1.32
Yarn-to-fiber factor					1.14	1.26	1.11	1.18

Recycled Cotton Fiber Conversion Analysis

	Range	Outlier	Average	Median	rCotton Apparel Woven	rCotton Apparel Knit	rCotton Home/ Denim	rCotton Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	3 – 30	40	19.8	20	20	20	5	20
Finished fabric weight								
Fabric processing	7 – 15	–	11.9	13	11.9	11.9	11.9	11.9
Knitting/weaving	1 – 3	–	1.9	2	2	2	2	2
Yarn weight								
Spinning - OE	7 – 15	–	12.3	11	12		12	15
Spinning - K	14 – 18	–	17	18		17		
Fiber weight								
Product-to-fiber factor					1.65	1.74	1.39	1.70
Fabric-to-fiber factor					1.32	1.40	1.32	1.36
Yarn-to-fiber factor					1.14	1.20	1.14	1.18

Based upon an LCA provided by one European recycled cotton supplier, spinning losses for mechanically recycled cotton is low compared with the loss rate for Indian suppliers which is generally much higher. The spinning loss is modelled by using a blended worldwide rate. Recycled cotton applies only to mechanically recycled cotton and typically has a higher fabric processing loss compared to cotton.

Polyester and Recycled Polyester Fiber Conversion Analysis

	Range	Outlier	Average	Median	Polyester Apparel Woven	Polyester Apparel Knit	Polyester Home	Polyester Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	3 – 30	40	19.8	20	20	20	5	20
Finished fabric weight								
Fabric processing	6 – 10	–	7.8	9.0	7.8	7.8	7.8	7.8
Knitting/weaving	1 – 8	–	4.1	5.5	2.5	6.5	2.5	6.5
Yarn weight								
Spinning - Filament	3 – 12	12	2.8	3.0	2.8		2.8	5.3
Spinning - Yarn	8 – 10	–	9.0	9.0		9		
Fiber weight								
Product-to-fiber factor					1.43	1.59	1.20	1.53
Fabric-to-fiber factor					1.14	1.27	1.14	1.22
Yarn-to-fiber factor					1.03	1.10	1.03	1.06

Recycled polyester values include both chemically and mechanically recycled polyester, and also include pre-consumer and post-consumer waste data.

Nylon and Recycled Nylon Fiber Conversion Analysis

	Range	Outlier	Average	Median	Nylon Apparel Woven	Nylon Apparel Knit	Nylon Home	Nylon Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	3 – 30	40	19.8	20	20	20	5	20
Finished fabric weight								
Fabric processing	6 – 10	–	7.8	9.0	7.8	7.8	7.8	7.8
Knitting/weaving	1 – 8	–	4.1	5.5	2.5	6.5	2.5	6.5
Yarn weight								
Spinning - Filament	3 – 12	12	2.8	3.0	2.8		2.8	5.3
Spinning - Yarn	8 – 10	–	9.0	9.0		9		

Fiber weight								
Product-to-fiber factor					1.43	1.59	1.20	1.53
Fabric-to-fiber factor					1.14	1.27	1.14	1.22
Yarn-to-fiber factor					1.03	1.10	1.03	1.06

Recycled nylon includes both chemically and mechanically recycled nylon. However, the current data is specifically focused on post-consumer waste and does not cover pre-consumer waste.

Manmade Cellulosics Fiber Conversion Analysis

	Range	Outlier	Average	Median	MMC Apparel Woven	MMC Apparel Knit	MMC Home	MMC Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	3 – 30	40	19.8	20	20	20	5	20
Finished fabric weight								
Fabric processing	8 – 13	–	10	9	9	10	9	10
Knitting/weaving	3 – 9	–	4.8	6	4.8	4.8	4.8	4.8
Yarn weight								
Spinning - Filament	1 – 2	–	1.5	1.5	1.5		1.5	2.75
Spinning - Yarn	1.5 – 8	25	4.4	4		4		
Fiber weight								
Product-to-fiber factor					1.46	1.53	1.23	1.49
Fabric-to-fiber factor					1.17	1.22	1.17	1.19
Yarn-to-fiber factor					1.02	1.05	1.02	1.03

The above conversion rates are derived from virgin manmade cellulosic production. Chemically recycled cotton or chemically recycled manmade cellulosics typically have a lower fabric processing waste compared to mechanically recycled cotton, therefore Textile Exchange recommends using rates for manmade cellulosics as a proxy if no further information on conversion rates is available.

Wool Fiber Conversion Analysis

	Range	Outlier	Average	Median	Wool Apparel Woolen	Wool Apparel Worsted	Wool Home	Wool Apparel Mix
Product weight								
Cut make trim (CMT) - Overall	4 – 12	–	8.5	7.5	8.5	8.5	4	8.5
Finished fabric weight								
Fabric processing	0	–	0	0	0	0	0	0
Knitting/weaving	5 – 8	–	6.5	6.5	6.5	6.5	6.5	6.5
Yarn weight								
Spinning - Woolen	5 – 30	–	19.5	19.5	19.5		19.5	13.5
Spinning - Worsted	5 – 10	–	7.5	7.5		7.5		
Scouring/Topmaking - Woolen	30 – 55	10	42.5	42.5	42.5		42.5	37.5
Scouring/Topmaking - Worsted	25 – 40	–	32.5	32.5		32.5		
Fiber weight								
Product-to-fiber factor					2.49	1.84	2.37	2.13
Fabric-to-fiber factor					2.27	1.69	2.27	1.95
Yarn-to-fiber factor					2.16	1.60	2.16	1.85

Cut, make and trim (CMT) for wool is considered differently and separately from the other fibers because the manufacturing process using knitting machines generally has lower processing losses than other fibers.

Scouring and top making is the most significant contribution to the high conversion rate in wool. Scouring refers to the process of removing oil from the animal hair and in cooler climates, where animal hair contains more oil, the processing loss can be up to 50%.

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