Textile Exchange Guide to Recycled Inputs

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The *Textile Exchange Guide to Recycled Inputs* is effective as of September 22, 2021.

Cover photo: MUD Jeans (Denim shredding at recycling factory)

English is the official language of the *Textile Exchange Guide to Recycled Inputs*. In any case of inconsistency between versions, reference shall be made to the English version.

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The *Textile Exchange Guide to Recycled Inputs* will be updated on a regular basis. You may submit feedback or questions at any time; send to Assurance@TextileExchange.org.

Document Revision History

GRS-202-V0.1 Guidance: Mechanically Recycling of Cotton, released June 2021
GRS-202-V1.0 Textile Exchange Guide to Recycled Inputs, released September 2021

Contents

Introduction

This document provides guidance for authorized certification bodies (CBs), certified sites, and buyers of certified materials to interpret how the Recycled Claim Standard (RCS) and Global Recycled Standard (GRS) definitions should be applied. While this document is not normative, it may be used as a supplement for interpretation decisions regarding the qualification of materials to be certified under the RCS or GRS.

About Textile Exchange

Textile Exchange is a global nonprofit that creates leaders in the sustainable fiber and materials industry. The organization develops, manages, and promotes a suite of leading industry standards as well as collects and publishes vital industry data and insights that enable brands and retailers to measure, manage, and track their use of preferred fiber and materials.

With a membership that represents leading brands, retailers, and suppliers, Textile Exchange has, for years, been positively impacting climate through accelerating the use of preferred fibers across the global textile industry and is now making it an imperative goal through its 2030 Strategy: Climate+. Under the Climate+ strategic direction, Textile Exchange will be the driving force for urgent climate action with a goal of 45% reduced CO2 emissions from textile fiber and material production by 2030.

Section A - General Information on Recycling

A1. References and Further Reading

The following Textile Exchange documents should be referenced in conjunction with this guide, and all can be found at TextileExchange.org/Standards:

- *CCS-101 Content Claim Standard*
- *CCS-201 CCS User Manual*
- *GRS-101-V4.0 Global Recycled Standard*
- *GRS-201-V4.2 GRS Implementation Manual*
- *RCS-201-V2.0 Recycled Claim Standard*
- *RCS-201-V2.2 RCS Implementation Manual*

In addition to the Textile Exchange documents listed above, the external publications listed below provide further insight and guidance on recycled materials:

- ISO 14021:2016 Environmental labels and declarations – Self-declared environmental claims (Type II environmental labelling)
- ISO 17088:2021 Plastics – Organic recycling - Specification for compostable plastics
- ISO 15270:2008: Plastics – Guidelines for the recovery and recycling of plastic waste
- ISO/TR 14049:2012 Environmental management – Life cycle assessment
- ISO 16929:2019 Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test
- ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories
- ScienceDirect – Environmental impact of textile reuse and recycling
- Zero Waste Europe – El Dorado of Chemical Recycling
- European Commission – Circular Economy Action Plan
- European Commission – A circular economy for plastic
- Accelerating Circular Supply Chains for Plastics
- This Is Plastics
- Ellen MacArthur Foundation
- Rieter - The Increasing Importance of Recycling in the Staple-Fiber Spinning Process, Part 1 and Recycling Spinning System

A2. Definitions

Refer to *TE-101 Terms and Definitions for Textile Exchange Standards and Related Documents* for definitions of terms used in the Content Claim Standard (CCS), RCS, GRS, and other standards related documents. This document focuses on waste used in textile production and therefore, the following additional definitions are helpful for understanding this document.

Primary Raw Materials: Virgin feedstocks that are either grown or extracted from the earth.

Secondary Raw Materials: See *reclaimed material* and *recovered material*.

Reclaimed Material[1]: Material that would have otherwise been disposed of as waste or used for energy recovery but has instead been collected and reclaimed as a material input, in lieu of new primary material, for a recycling.

May also be referred to as *recovered material*.

Recovered Material: See *reclaimed material*.

Pre-Consumer Materials[2]: Material diverted from the waste stream during the manufacturing process. Excluded is the reutilization of materials such as rework, regrind, or scrap generated in a process which is capable of being reclaimed within the same process that generated it.

Post-Consumer Materials[3]: Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product that can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Recycling: Refers to the processing of waste material for the original purpose or for other purposes, excluding energy recovery and reuse.

Material Recycling: Refers to the point in the recycling lifecycle when a *reclaimed material* is processed into a *recycled material*.

NOTE: This may be a physical (mechanical), chemical, or biological (organic) process.

Recycled Material[4]: Material that has been reprocessed from *reclaimed material* by means of a manufacturing process and made into a final product or into a component for incorporation into a product.

Reused Material[5]: A product or material which is used more than once in its original form. A reused product has not been discarded, and its reuse does not constitute a recovery (recovered/reclaimed) option.

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[1] This excerpt is taken from ISO 14021:1999, section 7.8.1.1, subsection c on page 14, with the permission of ANSI on behalf of ISO. © ISO 2013 – All rights reserved.
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[4] This excerpt is taken from ISO 14021:1999, section 7.8.1.1, subsection c on page 14, with the permission of ANSI on behalf of ISO. © ISO 2013 – All rights reserved.
[5] Based on ISO 15270:2008

A3. Basic Processing Steps

Recycling always starts with diversion from the waste stream, collection and sorting, and the recycling process. Following the principle of the waste hierarchy, the first priority should be to reduce the amount of waste generated. This can be done through creating increased efficiency in production or by making products designed to last. The next step is reuse. After a material has either met its intended use or can no longer be used as intended, it is recommended to look for ways to reuse the item as is without additional processing. Recycling materials should be a final step in the long life of a material. The below steps and diagram explain the recycling process.

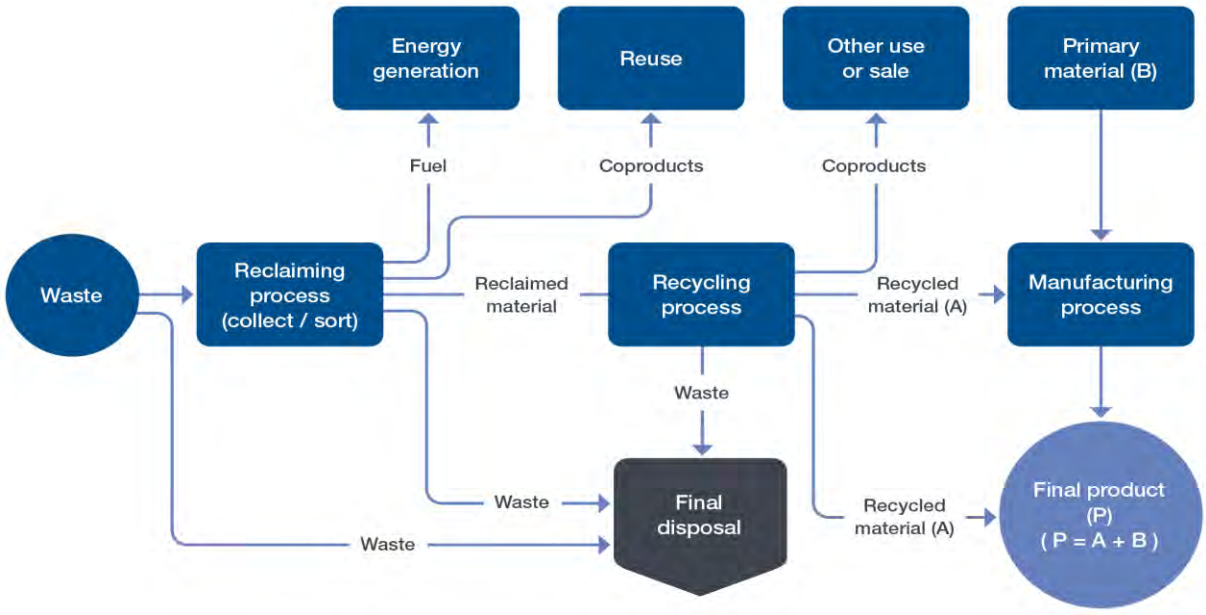
Step 1: Waste (pre-consumer and post-consumer)

Step 2: Collection and concentrating (reclaiming process)

Step 3: Recycling process (mechanical, chemical, biological)

Step 4: Further manufacturing if needed.

Diagram 1: Simplified Recycling System[6]



Recycled content of product (X%) = (A / P) × 100

[6] ISO 14021:2016 Environmental labels and declarations –Self-declared environmental claims (Type II environmental labelling)

A4. Types of Recycling

For the recycling process, there are different methods that are typically used depending on the material type and the intended use of the recycled material.

Mechanical Recycling

Processing of waste into secondary raw material or products without significantly changing the chemical structure of the material.

- **Shredding:**
  Any mechanical process by which wastes are fragmented into irregular pieces of any dimension or shape. Shredding usually signifies the tearing or cutting of materials that cannot be crushed by fragmentation methods applicable to brittle materials, as typically carried out in a hammer mill.

NOTE: When plastic is shredded before melting or heat process, this is not considered the recycling step.

- **Synthetic fiber / material and cellulosic (MMCF) fiber recycling:**
  Processing of plastics waste or any other synthetic materials and cellulosic (MMCF), animal, and plant-based material for the original purpose or for other purposes, excluding energy recovery. Takes plastic and reforms it to usable pellets with melting (heat) process or dissolution (acrylic dope, dissolving pulp).

Chemical Recycling

Chemical recycling, also called advanced recycling and recovery, refers to several different chemical processes that use existing and emerging technologies that return post-use plastic/material to their basic chemical building blocks for creating a versatile mix of new plastics, chemicals, fuels, and other products.

Chemical recycling can be divided into three different categories depending on the level of decomposition that the plastic waste will be subject to:

1. **Solvent-based purification**, which decomposes plastic back to the polymer stage.
2. **Chemical depolymerization**, which turns the plastic back into their monomers via a chemical reaction.
3. **Thermal depolymerization** (pyrolysis and gasification) which in some cases can be considered as chemical recycling by cracking the polymers back into monomers and further down into hydrocarbons. Thermal depolymerization technology can also produce fuels although, in that case, it can no longer be considered a form of recycling.

All these outputs (except fuels) are then reprocessed to form new plastics.

In simple terms, chemical recycling is breaking down plastic to its core building blocks at a molecular level.

Biological Recycling

Aerobic (composting) or anaerobic (digestion) treatment of biodegradable plastic waste under controlled condition using micro-organism to produce, in the presence of oxygen, stabilized organic residues, carbon dioxide, and water or, in the absence of oxygen, stabilized organic residues, methane, carbon dioxide, and water.

The two forms of biological recycling are biodegradation and organic recycling. Biodegradation[7] is the degradation of Animal, Plant-based materials caused by biological activity, especially by enzymatic action, leading to a significant change in the chemical structure of a material. Organic recycling is the controlled microbiological treatment of biodegradable plastic waste under aerobic or anaerobic conditions.

Controlled biological recycling is still a nascent technology and may have limited application in many supply chains. While the RCS and GRS could be used to verify that inputs to a biological recycling process were diverted from the waste stream, the standards are not intended to verify whether a material – such as a biopolymer – is recyclable or biodegradable.

NOTE: Chemical and biological (organic) recycling is currently used for plastic material only, such as Polyethylene (PE), Polyethylene Terephthalate (PET), Polypropylene (PP), Polystyrene (PS), Polyvinyl Chloride (PVC), Polyolefins (PE, PP), Polyurethane (PU), PA -Polyamides (PA), Polylactic Acid (PLA), Polycarbonate (PC), Polyhydroxyalkanoates (PHA), Polyethylene Furanoate (PEF), or a plastic mix.

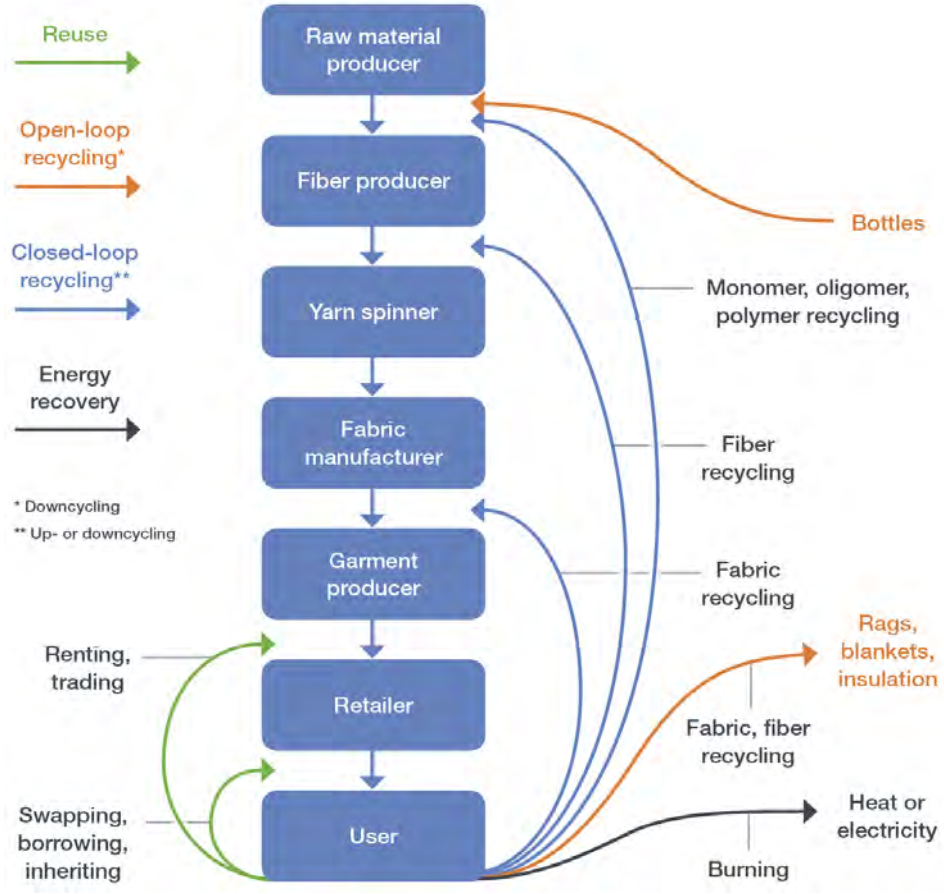
[7] ISO 16929:2019 Plastics–Determination of the degree of disintegration of plastic materials underdefined composting conditions in a pilot-scale test

Section B - Textile Waste Generation Examples

The examples in this section are taken from textile facilities and reflect the intended application of the definitions in section A2 of this document. All examples are for guidance purposes only. Users are expected to carry out their own assessment of the reclaimed material and exercise their best judgment on qualifying said material as pre-consumer or post-consumer waste.

Diagram 2 shows a classification of textile reuse and recycling based on the source of the waste. Diagrams 3 and 4 show the animal, plant-based and synthetic processes, illustrating which feedstocks are accepted under RCS or GRS based on their source.

Diagram 2: Classification of Textile Reuse and Recycling Routes[8]



NOTE: Reuse, renting, or trading of a garment or other finished product does not qualify as recycled input under GRS or RCS. These are examples of reuse without recycling.

[8] Environmental impact of textile reuse and recycling – A review

Diagram 3: Animal, Plant-based Fiber Process Steps and Accepted Recycled Feedstocks

Animal , Plant-based fibers generally include plant and animal-derived fibers and materials, primarily cotton, wool, and silk. However, this diagram also refers to cellulosic (MMCF) fibers (man-made cellulosic), such as lyocell, modal, viscose, acetate, cupro (cuprammonium rayon), etc. Refer to Section F for more information.

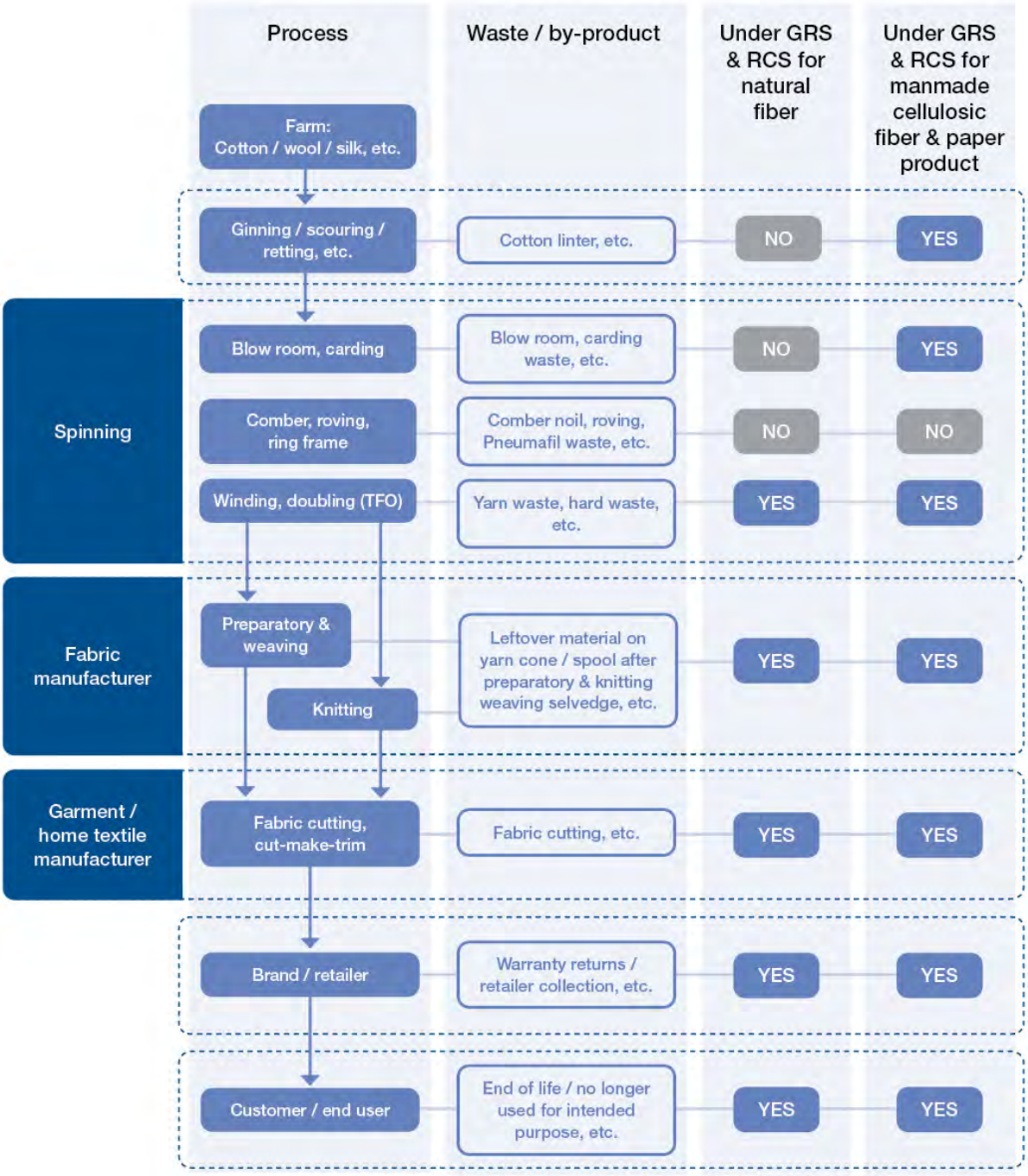
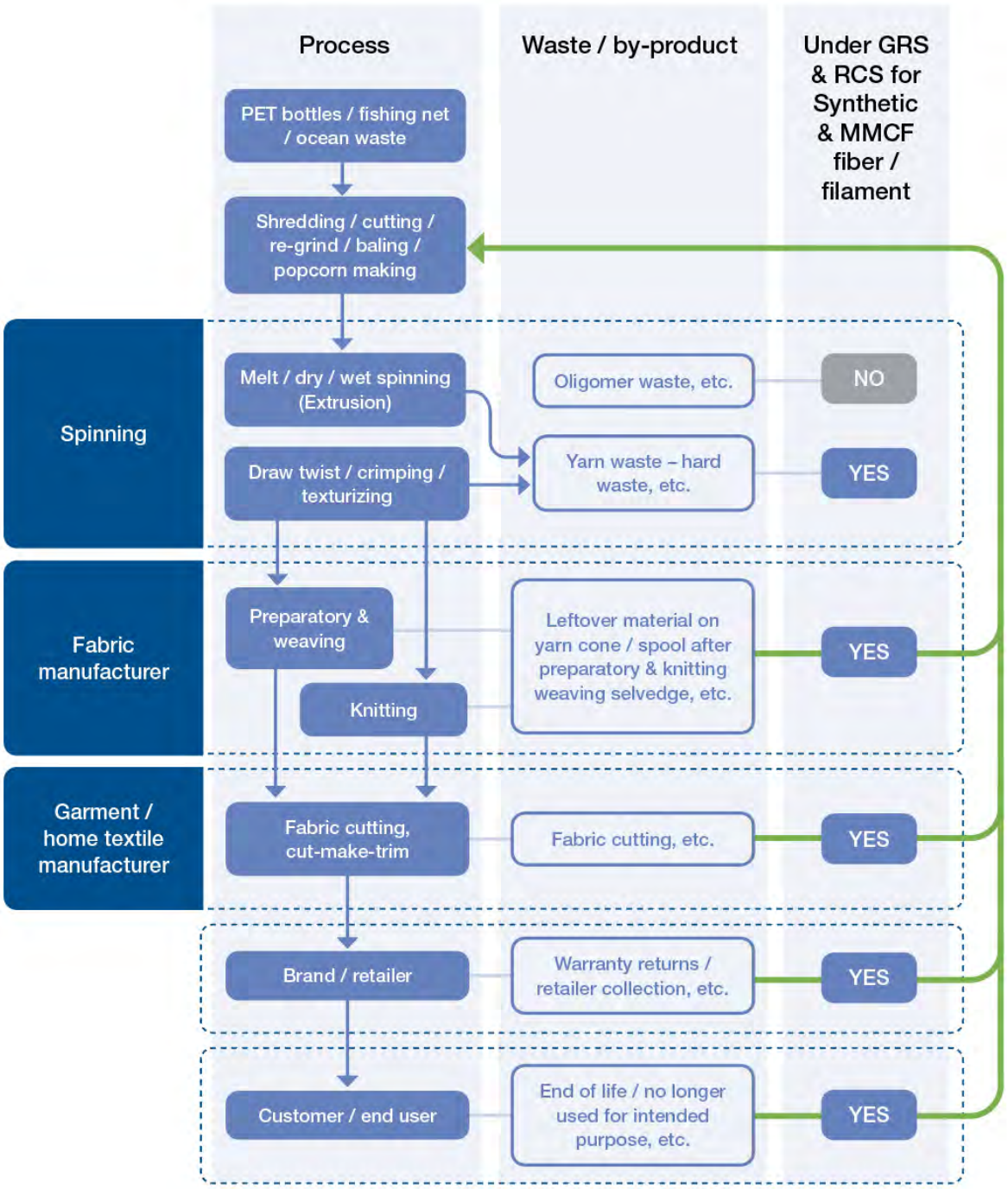


Diagram 4: Synthetic Fiber Process Steps and Accepted Recycled Feedstocks

Synthetic fibers include polyester, nylon, and acrylic. In this diagram, it is assumed that all pre-consumer and post-consumer reclaimed material goes to shredding, cutting, or popcorn making stages. Refer to Section F for more information.



Section C - Mechanical Recycling

Most recycled content is currently mechanically recycled. This occurs using three methods: shredding, pulp making, and melting/dissolution. This section describes all three methods of mechanical recycling.

C1. Shredding of Animal, Plant-based, Cellulosic (MMCF), and Synthetic Material

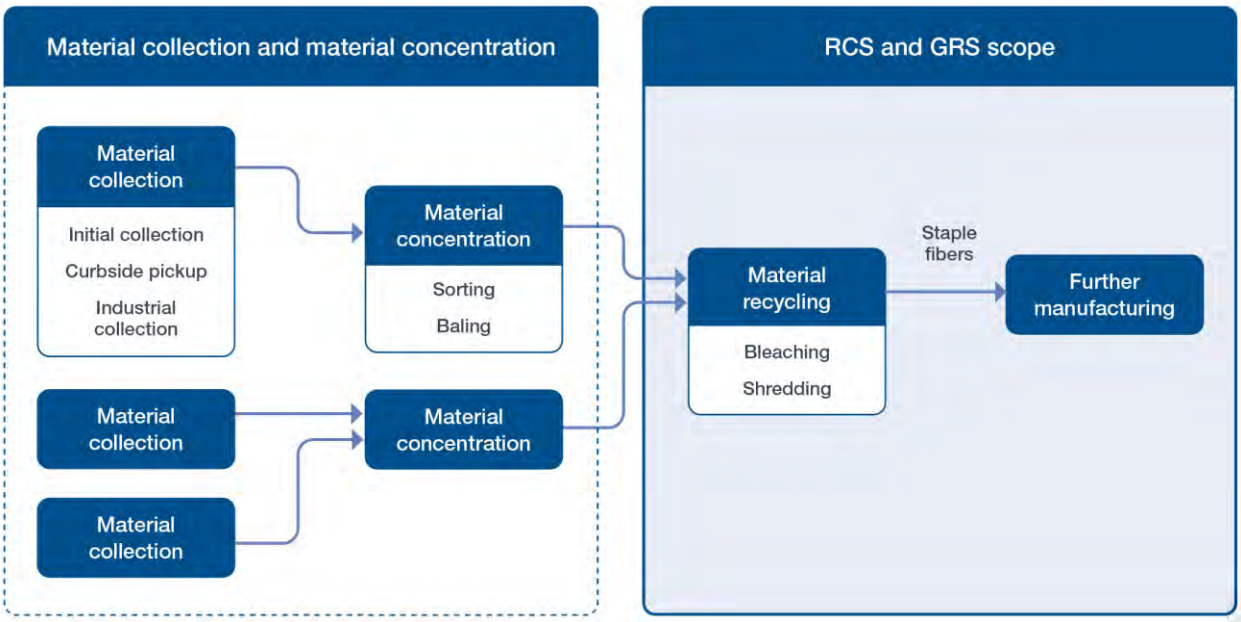
Processing of waste into a secondary raw material or product without significantly changing the chemical structure of the material is achieved via the shredding process. It may also be known as garneting.

Examples of fiber recycling feedstocks which are commonly shredded include cotton, wool, cashmere, other animal fiber, manmade cellulosic (MMCF) fibers (rayon, lyocell, acetate, viscose, cupro (cuprammonium rayon), viscose made from bamboo), mixed fibers, and polyester.

Material collection may be from pre-consumer or post-consumer sources. The most substantial volume of recycled cotton sources is produced through pre-consumer waste, such as cutting scraps. Post-consumer waste is more challenging to sort through due to various color shades and fabric blends, and is generally a more labor-intensive process.

Diagram 5: Process Flow – Mechanical Recycling by Shredding

This diagram includes the flow for both Animal, Plant-based and cellulosic (MMCF) fibers, as well as synthetic fiber recycling.



C2. Shredded Fiber – Technical Limitations

Due to the nature of shredding fibers, some shortening of staple length is unavoidable. For all fibers, this results in some technical limitations for recycled materials. Due to this technical limitation, staple length is an important risk factor to identify material which may have been claimed to be recycled but is actually virgin material. This section includes guidance for certified sites and certification bodies to understand the limitations of both shredded cotton and wool, as well as any other fiber/filament or material.

This document provides more detailed information to allow certification bodies to assess a product (yarn) made from mixed cotton and other blended fibers under RCS and/or GRS for both currently certified sites and new applicants.

Mechanically Recycled Cotton Specifications

Textile Exchange has identified cases where combed products made from mechanically recycled cotton fiber have applied for certification under RCS or GRS but which would not be possible due to known technical limitations.

- Due to the technical limitations of combing, carded, and recycled cotton yarn, only products containing mechanically recycled cotton with a yarn count of <Ne 34 and a fiber length of <22mm may be certified to the RCS or GRS without additional due diligence by the certification body. Products containing mechanically recycled cotton with a yarn count of >Ne 40 or a fiber length of >25mm is expected to not be certified to the RCS or GRS since they are not technically possible to produce.
- Any products certified to the RCS or GRS prior to May 15, 2021, that contain yarn counts of >Ne 34 or a fiber length of >22mm may remain certified for the duration of the scope certificate validity but is expected to be reviewed in detail prior to recertification. Therefore, the certification body is expected to check that products listed on the scope certificate meet this threshold during the next audit of a site where applicable.
- Effective May 15, 2021, scope or transaction certificates are expected to not be issued for products containing mechanically recycled cotton with a yarn count of >Ne 40 or a fiber length of >25mm.

Commonly Used Process

Garneting (shredding) of spinning yarn hard waste, selvage (selvedge), fabric cutting waste, or garment cutting waste can achieve a maximum fiber length as outlined in Table 1. For pre-consumer yarn hard waste, resulting fiber lengths will vary according to the quality of the materials.

Table 1: Parameters for Mechanically Recycled Cotton Fiber

Feedstock	Output Fiber length (mm)
Pre-consumer garment cutting waste	6 to 21
Pre-consumer yarn hard waste	6 to 26*
Pre-consumer yarn hard, woven selvage waste	6 to 21
Post-consumer denim/jeans waste	6 to 18

* Dependent on the input quality of pre-consumer materials.

Spinning sites perform mixing or blending of material to create yarn. Table 2 outlines a list of possible yarn counts.

Table 2: Possible Yarn Counts with Mixing and Blending Ratios

Type of Spinning	Yarn counts	Mechanically Recycled Cotton	Any Cotton (for Mixing)	Other (for Blending – non-cotton)
		Recycled ***Pre-consumer*** ***Post-consumer***	***Virgin***	***Virgin*** ***Recycled*** ***Pre-consumer*** ***Post-consumer***
Open End (OE)/Rotor	Ne 1 to Ne 24 (maximum)	5% to 100%	0% to 95%	0% to 95%
Open End (OE)/Rotor	Ne 24 to Ne 34 (maximum)	5% to 50%	50% to 95%	50% to 95%
Ring spun / Air jet (Vortex) spun – Carded, Carded compact, Carded core-spun	Ne 1 to Ne 16 (maximum)	5% to 100%	0% to 95%	0% to 95%
Ring spun / Air jet (Vortex) spun – Carded, Carded compact, Carded core-spun	Ne 16 to Ne 34 (maximum)	5% to 60%	40% to 95%	40% to 95%

Type of Spinning	Yarn counts	Mechanically Recycled Cotton	Any Cotton (for Mixing)	Other (for Blending – non-cotton)
		Recycled ***Pre-consumer*** ***Post-consumer***	***Virgin***	***Virgin*** ***Recycled*** ***Pre-consumer*** ***Post-consumer***
Ring spun / Air jet (Vortex) spun – Combed, combed core-spun, combed compact	Not possible to make			

The certification body may issue scope and transaction certificates as outlined above and is expected to verify these details during the on-site audit. The certification body should invalidate or not issue scope and transaction certificates where specifications fall outside of the possible fiber lengths and yarn counts.

Innovative Processes

Some production sites claim that technological innovation allows them to achieve a higher quality (fiber length and yarn counts) with mechanically recycled cotton fiber compared to regular production (as outlined in section C2). However, a fiber length of up to 26mm can only be achieved with pre-consumer yarn hard waste as shown in Table 3.

Table 3: Mechanically Recycled Cotton Fiber Parameters

Feedstock	Output Fiber length (mm)
Pre-consumer yarn hard waste [High quality fiber (length 29-40) in pre-consumer yarn]	Up to 26

The following Table 4 outlines the possible yarn counts with mixing and blending ratios in correlation with Table 3 as input.

Table 4: Possible Yarn Counts with Mixing and Blending Ratios

Type of Spinning	Yarn counts	Mechanically Recycled Cotton	Any Cotton (for Mixing)	Other (for Blending – non-cotton)
		Recycled ***Pre-consumer*** ***Post-consumer***	***Virgin***	***Virgin*** ***Recycled*** ***Pre-consumer*** ***Post-consumer***
Open End (OE)/Rotor / Ringspun / Air jet (Vortex) Spun – Carded, Carded compact	Ne 20 to Ne 30 (maximum)	5% to 100%	0% to 95%	0% to 95%
Ringspun / Air jet (Vortex) Spun – Carded, Carded Compact	Ne 30 to Ne 40 (maximum)	5% to 25%	75% to 95%	75% to 95%
Open End (OE)/Rotor	Any yarn count	Not applicable	5% to 95%	5% to 95%
Ringspun / Air jet (Vortex) spun – Carded, Carded **Compact, Combed, Combed Compact, Core-spun**	Any yarn count	Not applicable	Fiber length and yarn count relationship needs to be ensured (see Organic Cotton – A Fiber Classification Guide pages 4 through 6)*	

The certification body should verify such claims (as per Table 3 and 4) by reviewing a third-party test report and collecting a sample during the audit. Details of findings should be shared with Textile Exchange prior to issuing or renewing certification.

For more information on how cotton fiber quality relates to yarn count and product suitability for cotton, please refer to Organic Cotton: A Fiber Classification Guide which can be found at TextileExchange.org.

Shredded Wool – Technical Limitations

Garneting (shredding) of spinning yarn hard waste, selvage (selvedge), fabric cutting waste, or garment cutting waste can achieve a maximum fiber length as outlined in Table 5. For pre-consumer yarn hard waste, resulting fiber lengths will vary according to the quality of the materials.

Table 5: Mechanically Recycled Wool Fiber Parameters

Feedstock	Output Fiber length (mm)
Post-consumer garment cutting waste	20-50
Pre-consumer fabric cutting waste	20-60
Pre-consumer woven selvage, yarn hard waste	20-60

Spinning sites perform mixing or blending of material to create yarn. Table 6 outlines a list of possible yarn counts.

Worsted yarn is not possible to make with mechanical recycled wool fiber.

Table 6: Possible Yarn Counts with Mixing and Blending Ratios

Type of Spinning	Yarn counts	Mechanically Recycled Wool	Other Material*
Woolen spinning system (Ring carded Yarn)	Nm 1 – 10	100%	
	Nm 6 – 12	85-90%	10-15%
	Up to Nm 15	75-80%	20 – 25%
	>Nm 15	Difficult to make	
Open end spinning	Up to Nm 20	85-90%	10-15%

* Recycled polyester, polyester, mixed fiber, viscose, nylon, recycled nylon, recycled acrylic, acrylic etc.

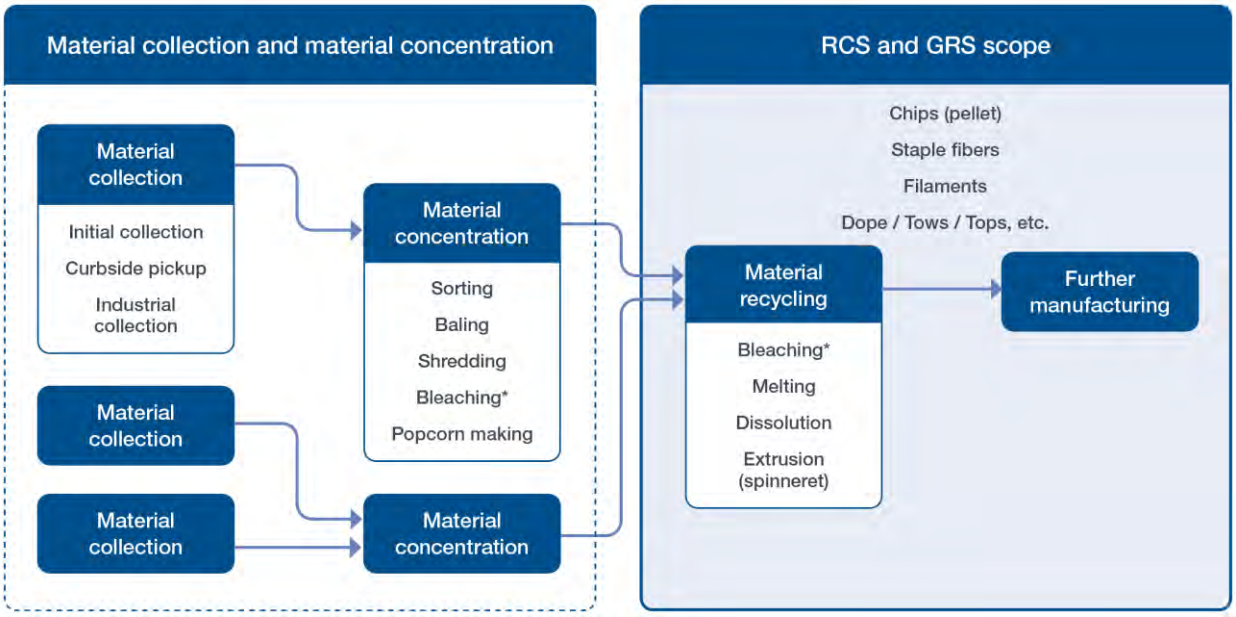
C3. Melting or Dissolution of Synthetic Material

Examples of mechanically recycled polymers include acrylic[9], nylon, and polyester. The output of material concentration with a bleaching process will be post-consumer processed flakes and without a bleaching process will be post-consumer unprocessed flakes. Common pre-consumer inputs for this process include textiles, woven selvage, and fabric or garment cutting waste. The most common post-consumer inputs are plastic bottles and textile waste, however, fishing nets are also used.

The initial output is either filament yarn or staple fiber. Examples of this type of filament include DTY – Draw Textured Yarn (DTY), Fully Drawn Yarn (FDY), Partially Oriented Yarn (POY), Low oriented Yarn (LOY), Highly Oriented Yarn (HOY), Air-textured Yarn (ATY), Fully Oriented Yarn (FOY) etc.

Diagram 6: Process Flow – Mechanical Recycling by Melting

This diagram includes the flow for mechanical recycling (melting) of polymers.



[9] Acrylic polymers and other acrylic waste are physical dissolutions during processing.

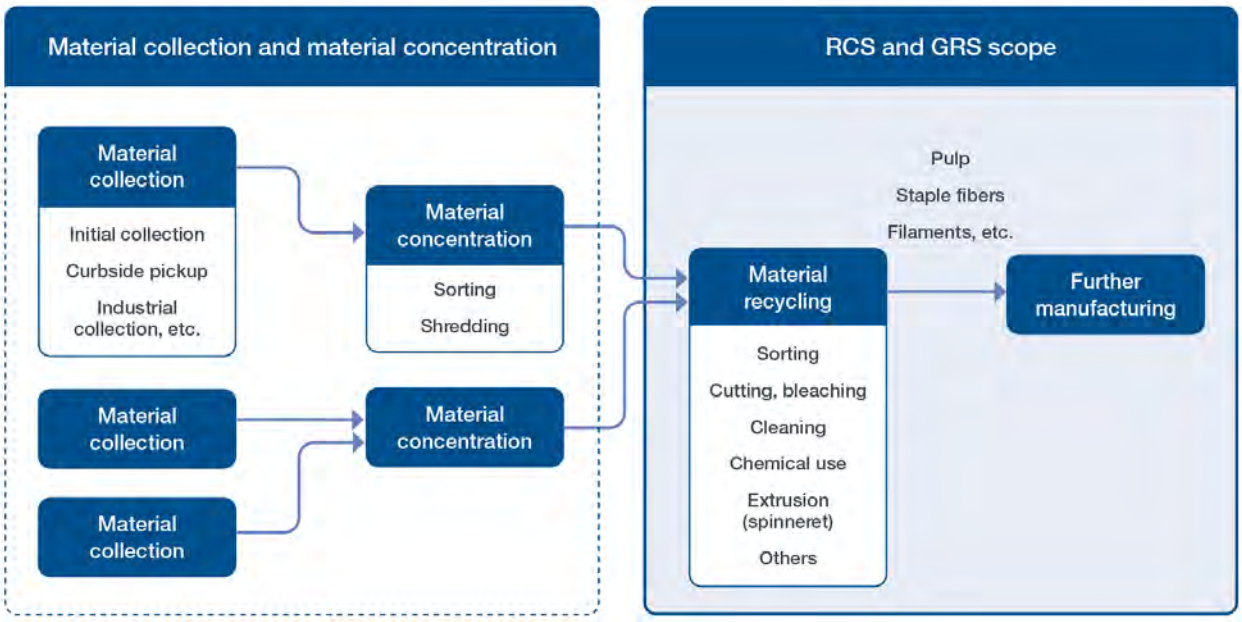
C4. Pulp from Plant Fiber/Material/Textiles Waste

Another source of recycling is turning cellulosic (MMCF) material into pulp and then fiber. The input materials are textile waste from plant-based materials (e.g. cotton, man-made cellulosic (MMCF)s) and waste from agriculture production. The initial output is pulp, filament yarn, or staple fiber of the following varieties: acetate, cupro (cuprammonium rayon), rayon, viscose, lyocell, and others.

A few production sites are also chemically recycling plastic, CO_2, and other materials to make cellulosic (MMCF) pulp, fiber, filament, PET, or PA instead of performing mechanical recycling.

Diagram 7: Process Flow – Pulp from Textile Waste

This diagram includes the flow for mechanical recycling (pulp making).

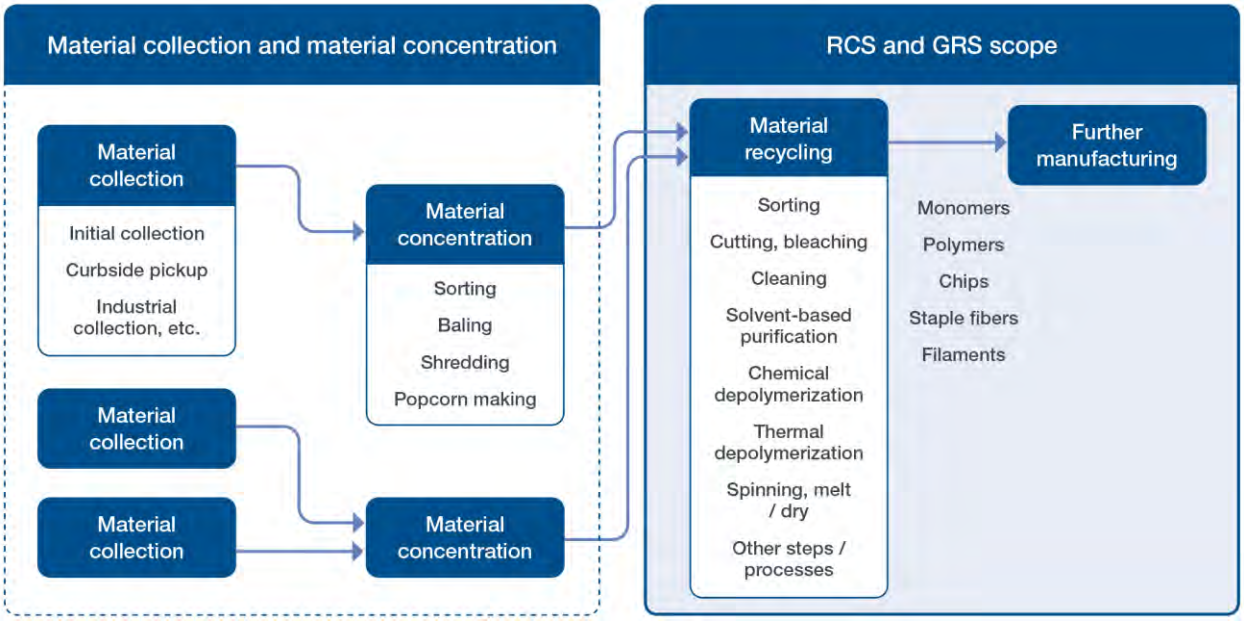


Section D - Chemical Recycling Synthetic Material

Chemical recycling almost always uses post-consumer materials as the input, with the primary target being to increase the recycling rates of post-consumer textiles. The initial output is either filament yarn or stale fiber. Examples of this type of filament include Draw Textured Yarn (DTY), Fully Drawn Yarn (FDY), Partially Oriented Yarn (POY), Low oriented Yarn (LOY), Highly Oriented Yarn (HOY), Air-textured Yarn (ATY), and Fully Oriented Yarn (FOY).

Diagram 8: Process Flow of Chemical Recycling

This diagram includes the flow for chemical recycling of synthetic fiber and material such as PET, elastane/spandex, nylon, and polyester.

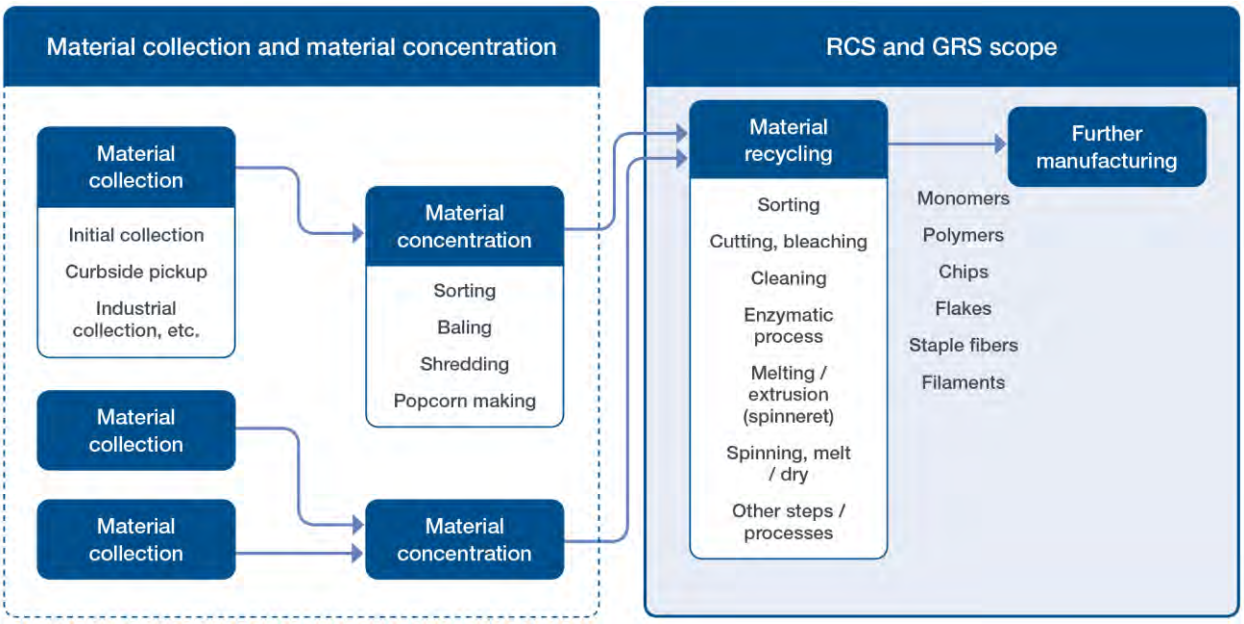


Section E - Biological Recycling

Controlled biological recycling is still a nascent technology and may have limited application in many supply chains. While the RCS and GRS could be used to verify that inputs to a biological recycling process were diverted from the waste stream, the standards are not intended to verify whether a material – such as a biopolymer – is recyclable or biodegradable. Refer A4 for more detail.

Diagram 9: Process Flow of Biological Recycling

This diagram includes the flow for biological recycling of fiber and material such as PET, elastane/spandex, nylon, and polyester.



Section F - Examples of Accepted Recycled Input Materials

The following tables provides example of pre-consumer and post-consumer input materials that have been accepted into the RCS and GRS. The categories include animal, plant-based fibers (plant and animal fibers and materials), cellulosic (MMCF) fibers (man-made cellulosic (MMCF)), and synthetic fibers.

Pre-consumer and post-consumer waste that can be used without undergoing a recycling process is not considered *recycled material* and therefore, is not accepted as an input for RCS or GRS.

Example: Fabric and fabric waste collected from post-consumer and pre-consumer garments (respectively) is sewn into new garments or bags etc. In this case, the waste is being reused rather than recycled. This type of material may be identified and tracked withing GRS and RCS, but may not be identified or labeled as “recycled” nor with any reference to the GRS and RCS.

Processes such as opening, cleaning, sorting, screening, contamination removal, balling, and/or converting size (bottle or fabric to a smaller size of flakes or fabric) are considered material concentration and not considered recycling.

Post-Consumer Sources

Material Source	Accepted as Reclaimed under Post-Consumer	Not Accepted as Reclaimed under Post-consumer
Sources	Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.	Materials that are discarded by a manufacture process but that have properties allowing it to be reused on site by being incorporated back into the same manufacturing process that generate it. Or can be sold in second market without any changes.
Brand/Retailer	Old garments collection programs End-of-life**	Second hand or second quality
Customer/End user	Old garments	

Material Source	Accepted as Reclaimed under Post-Consumer	Not Accepted as Reclaimed under Post-consumer
Government owned/operated collector or concentrator entities (i.e. municipality) or donation center; **Curbside pickup;** **Industrial collection;** **Business entity (Brokers/ Commercial operation -retail stores); and** **Non-profit organization**	• PET bottles • Fishing nets • Plastics • Tires • etc.	Garment / finished products from: • reused, renting • trading • swapping, borrowing, inheriting • other

Pre-Consumer Sources

Material Source	Accepted as Reclaimed under Pre-Consumer	Not Accepted as Reclaimed under Pre-consumer
Sources	Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.	Materials that are discarded by a manufacturing process but that has properties allowing it to be reused on site by being incorporated back into the same manufacturing process that generated it. OR Materials that can be sold in a secondary market without any changes.
Ginning & delinting		Cotton linter* Gin motes*
Scouring		Lanolin
Fiber dyeing		Internal and buyer quality rejection (such fiber may be used for mélange or heather

Material Source	Accepted as Reclaimed under Pre-Consumer	Not Accepted as Reclaimed under Pre-consumer
		or second grade production but not allowed in GRS or RCS)
Spinning		
Blow room		Blow room waste*
Carding		Carding waste*
Drawing		Drawing (draw frame)*
Combing		Comber noil (cotton) Comber noil (wool)
Top making		Top/tow waste
Roving frame		Roving waste
Ring frame	Ring frame yarn waste (hard waste)	Ring frame - pneumatic waste and automated vacuum collection (overhead travelling cleaners)
Winding machine	Winding machine yarn waste (hard waste)	Winding machine – automated vacuum collection (overhead travelling cleaners)
Open end	Open end yarn waste (hard waste)	Sliver waste
Air (vortex) spinning	Air (vortex) yarn waste	Air (vortex) fiber waste
Melt / Wet / Dry spinning **Texturization (Crimping)**	Melt, wet, dry, or texturizing (crimping) spinning yarn waste etc. (final)	Melt, wet, dry, or texturizing (crimping) spinning waste etc. (intermediate)
		Oligomer waste Canceled order (does not include quality rejection)***

Material Source	Accepted as Reclaimed under Pre-Consumer	Not Accepted as Reclaimed under Pre-consumer
Yarn dyeing and finishing	Quality rejections**	Internal & Buyer quality rejection (such fiber may be used for mélange or heather but is not allowed in GRS or RCS)
Preparatory		Unused and leftover stock of yarn at preparatory
Weaving	Woven selvage Quality rejection stock, any kind of quality rejection of fabrics**	Leftover stock of yarn or fabrics
Knitting		Unused and leftover stock of yarns
Pre-treatment, Dyeing, Finishing	Quality rejection fabrics**	Leftover stock**
Manufacturing (Cut, make, and trim)	Fabric cutting waste Quality rejection fabrics** Quality rejected garment (not worn)	Leftover stock**
Brand/Retailer	Consumer or warranty returns due to damage** Third party distribution chain returns (due to inferior quality) **	Leftover stock** Unsold goods and materials Aged goods without damage: more than 1 year Aged goods without damage at process categories: more than 1 year Sampling goods at any stage

* Allowed only as feedstock for cellulosic (MMCF) fibers/filament in dissolving pulp making process, acetate, cupro (cuprammonium rayon), rayon, viscose, lyocell, pulp for paper making, etc.

** As long as goods cannot be sold in secondhand market. Finished products which do not reach their full, end of life use are expected to not be classified as post-consumer but may be considered to be pre-consumer. Product returned to a retailer under warranty or functional components returned by the consumer at the time of purchased may be considered to be pre-consumer. Any return where the consumer receives a replacement product or a substantial refund or credit towards a new product is considered to be a warranty return. If a brand collects returns of its end-of-life products, these products may be considered to be post-consumer. To claims this material as post-consumer, the brand is expected to ensure that other product (such as warranty returns or overstock) are not mixed with end-of-life products.

*** For all kinds of process categories

Appendix A – Recommended Actions for Certification Bodies

Appendix A is only applicable to section C2.

New Applicant Organizations

1. The certification body should collect and share information with the Textile Exchange prior to approving fiber and yarn counts outlined in Tables 3 and 4.

2. The certification body should inform Textile Exchange if they believe that fiber and yarn counts outlined in Tables 1 and 2 are not possible to manufacture.

Organizations with Valid RCS and/or GRS Scope Certificate(s)

3. The certification body should collect the information related to production claims outlined in Tables 3 and 4 during the next audit and share it with the Textile Exchange prior to recertification.

4. The certification body should inform Textile Exchange if they believe that fiber and yarns counts outlined in Tables 1 and 2 are not possible to manufacture.

5. The certification body may issue transaction certificates for such product(s) provided that the certification body is satisfied with the authenticity of the product based on the data collected for 6.
6. The certification body should collect the information below and share it with the Textile Exchange Assurance Team for further evaluation:

    a. A process and material flow chart (from recycler to spinner);

    b. A list and photos of pre-consumer waste used as reclaimed inputs;

    c. A list and photos of post-consumer waste used as reclaimed inputs;

    d. A recycled cotton fiber test report;

    e. A list of all possible yarn counts (e.g. mix – recycled cotton + cotton, or recycled cotton + polyester/MMCF/acrylic);

    f. A yarn test report for yarn(s) outlined in 6.e. that outlines the yarn count, CSP/RKM value, and hairiness value;

    g. A comparative study/chart based on the test report that outlines:

- Virgin cotton vs mechanically recycled cotton fiber, and
- Yarn made with virgin cotton vs mechanically recycled cotton with yarn count and yarn count CV (coefficient of observed variation), CSP/RKM value, and hairiness value; and

h. A fabric test report for pilling for fabrics made with mechanically recycled cotton.

7. A third-party laboratory accredited to *ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories* should be used for testing of fiber and yarn quality.

8. The certification body and/or Textile Exchange may ask for additional information and/or supporting evidence.