SUSTAINABLE MATERIALS – RESULT 2020

Totals: sustainable 29% - conventional 71%

Material	Percentage
cotton (BCI)	24,3%
cotton organic (GOTS / OCS)	2,0%
cotton recycled	1,5%
jute	0,1%
polyester recycled (RGS)	1,5%
viscose Liva eco	0,1%
acryl	1,2%
cotton	38,2%
elastane	1,9%
nylon	1,2%
polyamide	1,6%
polyester	24,3%
polyurethaan	0,4%
viscose	1,1%
viscose bamboo	0,3%
Vinyl	0,1%
Coir	0,1%
Totaal	**100,0%**

SUSTAINABLE MATERIALS – RESULT 2021

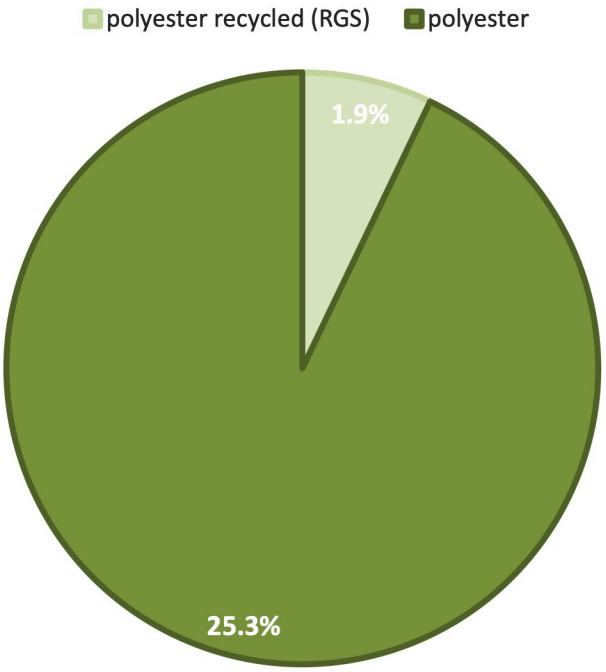
Totals: sustainable 36% - conventional 63%

Material	Percentage
cotton (BCI)	30,4%
cotton organic (GOTS / OCS)	2,4%
cotton recycled	1,1%
polyester recycled (RGS)	1,9%
RESALE*	0,1%
viscose ecovero	0,1%
viscose Liva eco	0,2%
acryl	3,4%
cotton	27,9%
elastane	1,9%
nylon	1,3%
polyamide	1,9%
polyester	25,3%
polyurethaan	0,5%
viscose	1,3%
viscose bamboo	0,2%
Totaal	**100,0%**

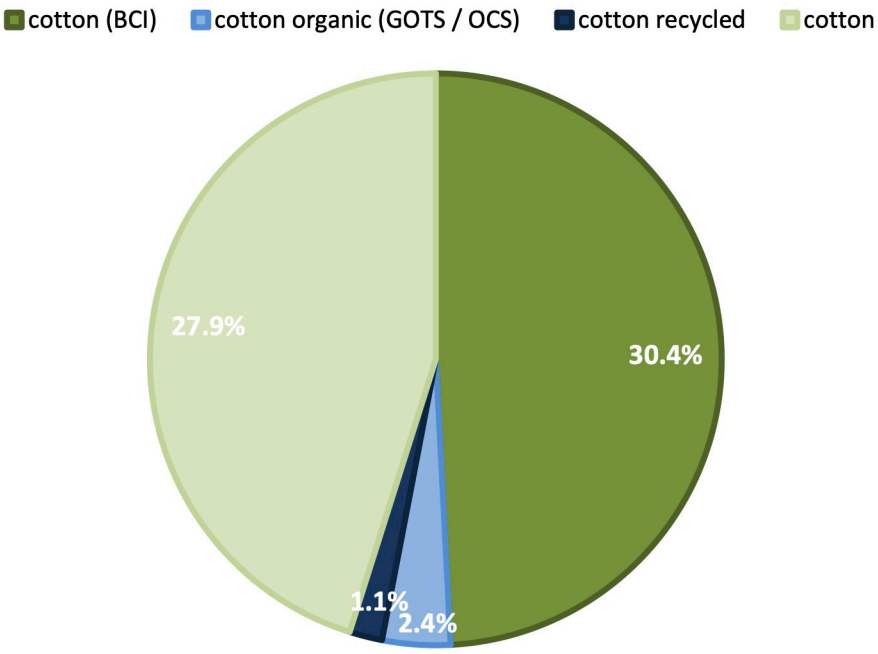
*RESALE is second hand clothing. For more info see https://www.zeeman.com/nl/resale.

SUSTAINABLE MATERIALS – RESULT 2021

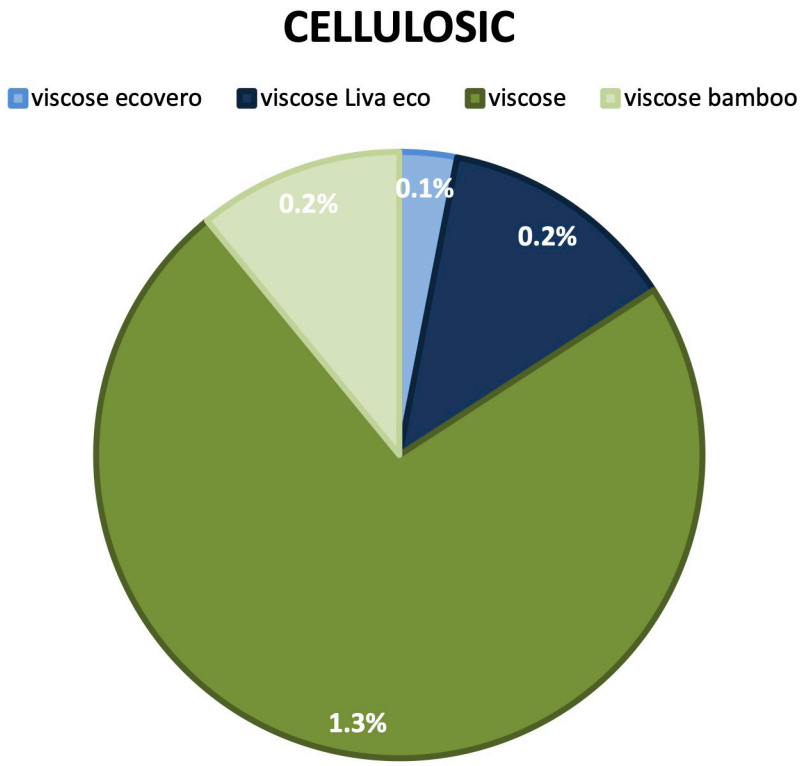
POLYESTER



COTTON



SUSTAINABLE MATERIALS – RESULT 2021



TOOL – HOW TO DEFINE A SUSTAINABLE MATERIAL

This overview is a first step to guide you in gaining insights into the risks of materials used and to support you in making choices. Various sources have been used. It is important to realize that these sources often do not, or not fully, look at all impact areas (environment, social, animals) and that in addition, not all links of the supply chain are often included. Reviewing and improving benchmarks and certification schemes is a continuous process. It is therefore always important to keep thinking carefully about the impact within your own supply chain and materials used and which steps you can take.		Material Type	Indication environmental impact		Potential animal welfare risk	Indication environmental and animal welfare impact	Brief description of risks	Sustainable Alternatives
Raw material	**Proof of certification / authenticity relevant yes/no**	**Man-made: Synthetic Man-made: Bio-Based Natural: Plant origin Natural: Animal origin**	**MADE-BY Environmental benchmark for fibers. See sharepoint:**	**SAC Higg MSI score See: https://apparelcoalition.org/higg-msi/**	**Source factsheets animal welfare v.1 developed by a AGT task team**	**Textile Exchange Corporate Fiber Material Benchmark scoring Methodology See https://textileexchange.org/ and or Sharepoint:**	**Qualitative description of human rights, environmental and animal welfare risks, or short explanation of the more sustainanble alternative**	**Recognized more sustainable alternative for mainstream material**
All common materials used for garments and textiles are listed.	For certain more sustainable options it is essential to ensure authenticity through proper checks and procedures according to the certification/monitoring process. This column shows whether this is relevant for the said material and whether you need to fill out the quantity for which you have access to certificates or other proof.	Distinguishes between 4 types of fiber. Natural fiber originating form plants (e.g. cotton) or animals (e.g. wool) and Man-made Synthetic and Man-made Biobased fiber. Synthetic fibers are made by man using chemical synthesis (e.g. polyester). Biobased fibers are based on natural inputs (cellulose) but further chemically processed (e.g. viscose)	MADE-BY Categories A to E, A is best, E is worst. Scores apply the production of fiber/yarn only and do not cover the full life cycle of the material	The lower the score, the better the environmental performance. Scores apply to the production of fiber/yarn only and do not cover the full life cycle of the material. In januari 2020 the SAC replaced the single MSI score by only showing the score on all 5 different environmental impact areas of the MSI. Go to HIGG MSI to see the individual scorings. You may only compare these scores within the same type of material.	Scores reflect likely range of potential animal welfare risks as laid down in the so called Five Freedoms: 1.Freedom from hunger or thirst 2.Freedom from discomfort 3.Freedom from pain, injury or disease 4.Freedom to express normal behaviour 5.Freedom from fear and distress. Risk are categorised as low, medium or high.	The higher the score, the lower the impact. Textile Exchange (TE) uses 4 levels: Level 1: conventional, level 2: improved, level 3: progressive, level 4: advanced. You can only distinguish between levels within the same type of category, e.g. cotton. The levels are part of the TE Corporate Fiber & Materials Benchmark 2019. Please note that the methodology and ranking is currently under review. A new more robust and comprehensive update will be released in 2021. Scores apply to the production of fiber/yarn only and do not cover the full life cycle of the material and mainly focus on environmental aspects.	Only the most frequent, serious and documented risks are described. Other risks might be applicable and depend on exact production method, country and other factors.	The below mentioned materials are perceived as more sustainable than their mainstream counterparts. This claim is either based on third party certification and/or common understanding/agreement of key stakeholders in the sector. The list of mentioned materials in annually updated. The list addresses more sustainable raw materials, which means the sustainability of the raw fiber, hides or unprocessed extruded yarn. The sustainability of the processing of the fiber, yarn or hides (e.g dyeing, finishing and tanning) is considered under the topic of water, energy and chemicals (WECH).
Acetate		Bio-based	not available	23.9	not applicable	Level 1		
Acrylic/Polyacrylic		Synthetic	D	18.0	not applicable	not available		Polylana (recycled polyester)
Bamboo viscose		Bio-based	E	not available	not applicable	not available	**Environment:** It is important to distinguish between bamboo and bamboo viscose. Bamboo is seen as a green crop. It requires little water, fertilizer and pesticides and grows on poor soils. In order to produce bamboo viscose however it is quite common to use strong chemicals such as sodium hydroxide (caustic soda) and sodium sulphide to produce bamboo pulp. This process also requires large amounts of water. Bamboo pulp is dissolved with caustic soda and carbon disulphide creating a viscous solution which is then purified and spun into fibres.	
Cotton, conventional		Plant origin	E	60.5	not applicable	Level 1	**Environment:** conventional cotton is a highly water and pesticide intensive crop. An estimated 8 to 12% of the pesticides used worldwide are applied on cotton fields. In developing countries this percentage is even higher while roughly only 2.5% of world's arable land is used for farming cotton. Cotton also requires a lot of water. Irrigation is required for about 75% of all global cotton production. An increased share of conventional cotton is genetically modified (GM or BT cotton) **Human Rights:** increased risks of child labour, poverty risks due to low income or wages, illness and deaths related to pesticide use, increased risks of informal labour and forced labour (Uzbekistan).	Better cotton Cotton Made in Africa (CmiA) Fairtrade cotton (certified) Cotton, organic (and in-conversion) (certified) Recycled cotton (certified)
Cotton, Better cotton	yes	Plant origin	not available	not available	not applicable	Level 2	The Better Cotton Initiative (BCI) brings together farmers, industry, retailers, brands and NGOs to improve the environmental, social and economic conditions while growing cotton. Over 1.5 million farmers across 23 countries produce Better Cotton. Impact studies show the reduced impact on environment and improved impact on the economic well-being of farmers.	
Cotton, CmiA	yes	Plant origin	not available	13.4	not applicable	Level 3	Cotton made in Africa (CmiA) is similar to Better Cotton. Focus is however on farmers in African countries only. Key difference with the Better Cotton Initiative is that CmiA prohibits genetically modified cotton (GM or BT cotton) while BCI allows for (is technically neutral) GM cotton.	
Cotton, Fairtrade (certified)	yes	Plant origin	not available	not available	not applicable	Level 3	Fairtrade aims to improve the situation of farmers and their environment by setting strict criteria related to the social, environmental and economic conditions of cotton farmers. Specific characteristics for Fairtrade include the set minimum price for cotton and the Fairtrade premium for farmers	
Cotton, organic (and in-conversion) (certified)	yes	Plant origin	B	11.9	not applicable	Level 3	**Environment:** organic certified cotton (at farm level) prohibits/restricts synthetic pesticides and prohibits the use of genetically modified seeds. Water use is not addressed in the standard but since organic cotton is often grown in rain fed areas, water consumption tends to be lower than conventional irrigated cotton. Organic farming include a focus on the improvement of soils via practices like crop rotation and the eapplication of natural fertilizer. **Human Rights:** labour issues are not addressed in organic standards on farm level. Certain organic projects/cooperatives do however address social or human rights issues. Most used organic certification schemes are OCS and GOTS. Main difference is that Gots not only includes farm level, but all tiers of the supply chain. Mainly on environmental aspects, but also basic levels of human rights.	
Cotton, Recycled cotton (certified)	yes	Plant origin	not available	1.0	not applicable	Level 4	**Environment:** Recycled cotton is produced with certified pre- or post-consumer waste. The environmental impact of recycled cotton is reduced when compare to conventional cotton because the farming and ginning of cotton is skipped in the process of recycling. The water, pesticides, fertilisers and energy normally consumed at farm and ginning level are saved. Recycling also reduces pressure on the global available area of farmland necessary to provide food, feed, fibre and fuel for a growing world population. The recycling process mainly involves transport, hand labour (sorting) and mechanical processing (shredding) and is therefore very environmental friendly. **Human Rights:** labour issues related to the recycling of cotton are not in depth addressed in recycled standards.	
Cupro/Cupro ammonium rayon		Bio-based	E	not available	not applicable	not available	**Environmental:** Is produced in a cuprammonium process: copper oxide dissolved in ammonium hydroxide (so-called blue solutions) to finally dissolve cellulose parts. Some countries decided to quit with this production process due to the very harmful production process. There are manufacturers that make sustainability claims, related to the use of recycled cotton (the cotton linters are used, which are normally a waste product, since these are too tiny to spin with) and a less harmful production process. Important is that cupro can only be claimed as a 'more sustainable' material, when a cloed-loop production process is in place.	
Down & feathers, duck or goose		Animal origin	not available	5.2	Medium risk	Level 1	**Animal welfare:** main risks apply to housing (mainly ducks), forced feeding (ducks and geese), live plucking (geese) and beak trimming (Moscovy duck). Housing in barns can lead to physical discomfort, health problems and stress. Living in cages restricts the natural needs (e.g. lack of access to open water). Forced feeding, often for the production of foie gras, can lead to several health- and welfare-risks. Moreover, foie gras animals often live individually in cages. Live plucking can lead to injuries and defects of the skin. Beak trimming is often carried out without anaesthesia, and is painful and stressful.	RDS (Responsible Down Standard) certified recycled down & feathers, TDS, Down pass
Down & feathers , duck or goose RDS certified	yes	Animal origin	not available	not available	Low Risk	Level 3	**Animal welfare:** Full chain of custody scheme, parent farms optional. RDS certification prohibits forced feeding and live plucking of birds, and prescribes general animal welfare measures. Annual announced and unannounced audits on practically all farms.	
Down & feathers , duck or goose TDS certified	yes	Animal origin	not available	not available	not applicable	Level 3	**Animal welfare:** Full chain of custody scheme, parent farms obligatory. TDS certification prohibits forced feeding and live plucking of birds, and prescribes basic animal welfare measures. Regular unannounced audits, 100% of the high risk farms	
Down & feathers , duck or goose Down Pass certified	yes	Animal origin	not available	not available	not applicable	Level 3	**Animal welfare:** Full chain of custody scheme, parent farms optional. Down Pass certification prohibits forced feeding and live plucking of birds, and prescribes basic, general AW requirements, audits based on EU and national legislation. Regular announced and unannounced audits, 100% of high risk farms (but risk calculation slightly flawed).	
Down & feathers , duck or goose recycled (Certified)	yes	Animal origin	not available	not available	not applicable	Level 4	RCS and GRS set requirements for third-party certification of recycled input. GRS includes additional criteria for social and environmental processing requirements and chemical restrictions. GRS covers products made with a minimum of 20% recycled material. As per label grade RCS offers two logo varieties: RCS 100 (minimum 95% recycled material content) or RCS blended (minimum 5% recycled material content)	
Elastane (spandex)		Synthetic	E	29.1	not applicable	not available	**Environment:** As for other synthetic fibres, the process of making elastane takes toxic chemicals and is energy intensive. Elastane does not have a long lifespan and is a vulnerable fibre to dry heat. Over 2-5% elastane in a product makes mechanical recycling difficult	Biobased elastane Recycled elastane (spandex) certified
Biobased elastane		Bio-based	not available	not available	not applicable	not available		
Recycled Elastane (spandex) Certified	yes	Synthetic	not available	not available	not applicable	not available		

Exotic skins (crocodile, snake, etc.)		Animal origin	not available	not available	High Risk	not available	**Animal welfare:** Crocodiles and snakes experience stress, diseases, fear and are limited in their natural behaviour while being kept on farms. The conditions these animals face are generally appalling, with extreme confinement, brutal slaughter practices and blurred lines with wildlife trafficking. Apart from the injuries that e.g. crocodiles in farms suffer due their environment the main risks apply when the animals are being killed. Clubbing and shooting (crocodiles) and clubbing, beheading or suffocating (snakes) is practiced. These methods can be ineffective, leading to animals being skinned alive.	
Fur (fox, rabbit, mink, raccoon dog, etc.)		Animal origin	not available	not available	High Risk	not available	**Animal welfare:** Fur animals are not domesticated and therefore not adapted to humans and captivity. On fur farms they are kept in wire mesh cages which limit natural behaviour and the basic needs of the animals. This can lead to physical, psychological and behavioural problems as well as increased infant mortality. Killing by electrocution or gasification can cause fear, pain and stress. Animal welfare risks of wild caught animals are related to the trapping method. In live traps there is a large risk of hunger, thirst, pain and stress. Leg-hold traps lead to injuries, and animals can also get injured while trying to free themselves. Lethal traps often do not lead to an immediate death, causing pain and stress. An unwanted side-effect of trapping, is that other animals can also be caught in these traps.	Re-used Fur, Recycled synthetic fur (Ecopel)
Recycled Synthetic Fur	yes	Synthetic	not available	not available	not available	not available		
Fur, Welfur	yes	Animal origin	not available	not available	High risk	not available	WelFur is an industry-owned certificate currently focussing on mink and fox farms in Europe. The keeping requirements on the controlled farms are largely based on the insufficient and outdated Council of Europe Recommendations (1999). Thus the scheme fails to adequately address significant welfare problems caused by the confinement of animals to battery cage systems on fur farms. WelFur criteria do not ensure that the species in question can realize their species-specific needs, for example by demanding access to bathing water for minks or sites for digging for foxes. The approach to combine different welfare measures into an overall farm score obscures individual measures and therefore allows serious cases of individuals suffering from poor welfare to be masked.	Recycled synthetic fur (Ecopel)
Hemp		Plant origin	C	51.9	not applicable	not available	**Environment:** Hemp fiber is found in the stalk of the hemp plant. Hemp is a rotative and renewable crop which grows quickly while low quantities of pesticides and fertilisers are being applied. Hemp is also a rain fed crop which does not need irrigation. The applied retting technique (which separates the stalk from the fiber) influences the environmental footprint of hemp. In Europe only natural or dew retting is allowed. Water retting in water tanks with chemicals was abandoned in the 1980s due to environmental hazards. Water or chemical retting is still used outside Europe.	Organic Hemp
Organic Hemp	yes	Plant origin	not available	not available	not applicable	not available		
Jute		Plant origin	not available	8.5	not applicable	not available		
Kapok		Plant origin	not available	not available	not applicable	not available		
Fairtrade Kapok	yes	Plant origin	not available	not available	not applicable	not available		
Leather/suede - Cow/calf		Animal origin	not available	133.0	Medium risk	not available	**Animal welfare:** In intensive production systems with high stocking densities, cattle cannot exhibit certain natural behaviour. A lack of bedded lying areas in stables is also of concern. In feedlots (common in the USA or Australia), limited availability of shade and shelter can cause immense physical discomfort. Mutilations like disbudding, polling (dehorning), tail docking, tooth clipping, branding, ear tagging and castration are often done without anaesthesia and pain relief. The early weaning of calves leads to stress. Cows are often transported over long distances without the provision of food and water, leading to hunger, thirst, stress and diseases. Slaughtering sometimes takes place without stunning, causing pain and stress and ineffective stunning is also of concern.	Organic leather/suede (Certified)
Leather /suede- Goat		Animal origin	not available	125.7	Medium risk	not available	**Animal-welfare:**Mutilations such as castration and dehorning are of great concern. Removing horns can lead to long-lasting pain and brain damage. When grasslands are degraded, plants contain too little nutrition, and the goats can experience hunger and other physiological consequences. A lack of shelter can lead to physical discomfort and disease, and goats kept indoors are limited in exhibiting their natural behaviour. Rough handling on farm, during shearing and transport is another concern. Goats can be transported over long distances, sometimes by boat, without access to food and water, leading to hunger, thirst, pain, stress, and injuries. Slaughtering goats can take place unstunned, causing pain and stress.	Organic leather/suede (Certified)
Leather/suede - Lamb		Animal origin	not available	not available	Medium risk	not available	**Animal welfare:** In extensive production systems when sheep stay outdoors permanently, a lack of shelter can cause physical discomfort in areas with extreme weather; especially lambs are susceptible. Overgrazing decreases the nutritional content of the grass, leading to hunger and disease. Sheep in barns are sometimes not fed enough. Indoor housing can also lead to stereotypical behaviour and health problems (such as foot rot). Mutilations (f.e. tail docking, castration, mulesing) done without anaesthesia cause pain, and sometimes infections. Rough handling is another concern. Long distance transport(f.e. by boat), without access to food and water, causes hunger and stress. Slaughtering sheep can take place unstunned, causing pain and stress.	Organic leather/suede (Certified)
Leather/suede - Pig		Animal origin	not available	125.7	Medium risk	not available	**Animal welfare:** physical mutilations such as castration, tail docking and tooth clipping are often carried out without anaesthesia, and lead to pain, stress and health problems. Close confinement of pigs in indoor systems and sow stalls raises welfare concerns because the lack of freedom and barrenness of the surroundings. Pigs can be transported over long distances in crammed, uninsulated and unventilated trucks and train carriages, leading to stress, pain, injuries, hunger and thirst. During slaughtering main concerns are rude handling, inadequate stunning (failure stunning) or CO2 stunning, the latter causing enormous stress.	Organic leather/suede (Certified)
Organic leather/suede (Certified)	yes	Animal origin	not available	not available	Low Risk	not available	**Animal welfare:** organic standards linked to live stock and meat production consider animal welfare. Specific issues like handling transport, slaughter and the tanning process of leather are (not always) taken into account.	
Recycled Leather (certified)	yes	Animal origin	not available	not available	not available	not available		
Linen		Plant origin	C	42.8	not applicable	not available	**Environment:** Linen fiber is found in the stalk of the flax plant. Flax is a rotative and renewable crop which grows quickly while low quantities of pesticides and fertilisers are being applied. Flax is also a rain fed crop which does not need irrigation. The applied retting technique (which separates the stalk from the fiber) influences the environmental footprint of linen. In Europe only natural or dew retting is allowed. Water retting in water tanks with chemicals was abandoned in the 1980s due to environmental hazards. Water or chemical retting is still used outside Europe.	Organic Linen (certified)
Linen, organic (Certified)	yes	Plant origin	A	not available	not applicable	not available	**Environment:** see the description for linen. Organic linen adds the prohibition/restriction of synthetic pesticides and only allows for dew retting.	
Lurex		Synthetic	not available	not available	not applicable	not available		
Lyocell		Bio-based	not available	19.1	not applicable	Level 2		Tencel Lyocell, Refibra
Lyocell, Tencel Lyocell, Refibra	yes	Bio-based	B	9.5	not applicable	Level 3	**Environmental:** Tencel lyocell is a lyocell product developed by a company named Lenzing. Tencel is made from cellulose of eucalyptus wood. Eucalyptus is a fast growing tree which grows on poor soils and does not need irrigation, synthetic pesticides or extensive use of fertilisers. The trees are harvested from farms certified by the Forest Stewardship Council (FSC). The transformation of wood pulp to fibre takes place via a closed loop process. The non-toxic solvent which is used is recovered up to 99.5% and is then recycled and reused in production. Remaining emissions are broken down in water treatment plants. The complete process is rewarded with the EU Eco Label. Refibra is a new member of the Lenzing lyocell family. Part of the fibre is spun from pre-consumer cotton waste (left-overs form the cutting table). Impacts and process are similar to the desciption provided for Tencel lyocell.	
Modal		Bio-based	D	29.1	not applicable	Level 2	**Environment:** Modal fibres are improved viscose fibres. They have better and more stable textile performance properties. Modal is stronger, both wet and dry, more breathable and has more resistance to shrinkage and pilling. The raw material for Modal are the same as for viscose, moderate growing natural renewable sources, mainly beech trees (its important to be aware of the source from the trees). The production is chemical and energy intensive. The spinning bath needs additional chemicals, but these are less toxic compared to viscose. The production generates emissions to air. Modal has a lower water footprint compared to viscose, but still Modal is not seen as a more sustainable alternative.	Tencel Modal
Modal, Lenzing Modal, Tencel Modal	yes	Bio-based	not available	4.9	not applicable	Level 3	**Environment:** Lenzing Modal differs from other Modals via Lenzings efforts to reduce and recover energy and via the aim to use pulp from certified forests (FSC or PEFC certified). All Lenzing production sites are ISO 14001 certified	
Neoprene (Chloroprene rubber)		Synthetic	not available	13.3	not applicable	not available		
PLA (polylactic acid)		Bio-based	C	21.1	not applicable	not available		

Polyamide (Nylon)		Synthetic	E	26.6 (Nylon 6) 30.4 (Nylon 6.6)	not applicable	Level 1	**Environment:** The input used to produce polyamide contains crude oil derived chemicals like benzene and butadiene. Crude oil is a non-renewable resource and therefore limited. Polyamide production is energy intensive and is linked to high greenhouse gas emissions	Chemical Recycled Nylon (Certified) Mechanical Recycled Nylon (Certified)
Polyamide (Nylon), chemically recycled	yes	Synthetic	B	not available	not applicable	Level 4	**Environment:** Chemical recycling is very different from mechanical and is essentially de-polymerisation of the polymer to its building blocks (monomers) and then polymerising again. This proces has a higher environmental footprint than mechanical recycling as it happens at high temperatures and require more chemical additives. This is commercially done for PA6, called Econyl and in the meantime other recPA-brands are entering the market.	
Polyamide (Nylon), mechanically recycled	yes	Synthetic	A	3.9	not applicable	Level 4	**Environment:** Recycled polyamide can be made by using post-consumer waste and post-industrial waste, such as fishing nets, carpets and used apparel. The proces is about melting and filament extrusion. As waste material is used, which would otherwise be sent to landfill or incinerated, non-renewable resources and energy is saved.	
Polyester		Synthetic	D	11.0	not applicable	Level 1	**Environment:** Polyesters are manufactured using petroleum from which the constituent acids and alcohols are derived. Petroleum is a non-renewable resource and therefore limited. Polyester production is energy intensive and is linked to high greenhouse gas emissions	Chemical Recycled Polyester (Certified) Mechanical Recycled Polyester (Certified) Polylana
Polyester, chemically recycled	yes	Synthetic	B	5.4	not applicable	Level 4	**Environment:** see the description for mechanically recycled polyester below. Chemical recycling has a higher environmental footprint than mechanical recycling. This is because chemical recycling involves more energy as de-polymerisation and re-polymerisation happen at high temperatures and require more chemical additives	
Polyester, mechanically recycled	yes	Synthetic	A	3.9	not applicable	Level 4	**Environment:** Recycled polyester is manufactured using waste material which would otherwise be sent to landfill or incinerated. Recycling saves non-renewable resources (petroleum) and also significantly saves energy and reduces the amount of greenhouse gas emitted when compared to conventional polyester	
Polyester, Polylana		Synthetic	not available	not available	not applicable	not available	Can be used as an alternative on Acrylic, although it is polyester based.	
Polyurethane (PU) and Thermoplastic Polyurethane (TPU)		Synthetic	not available	30.7	not applicable	not available		Water-based PU
Water- Based PU		Synthetic	not available	not available	not applicable	not available		
PVC (polyvinylchloride)		Synthetic	not available	not available	not applicable	not available	**Environment**: PVC or polyvinylchloride is increasingly banned by both brands and governments due to its toxic effect on man and environment. PVC is said to be toxic, persistent, bio accumulative and is considered as being hormone disruptive and carcinogenic	
Ramie		Plant origin	C	not available	not applicable	not available		
Silk		Animal origin	not available	93.6	Medium risk	not available	**Animal welfare:** silkworms and moths can be negatively affected due to the fertilisers and pesticides used for the growing of mulberry trees and the placing of nets which prevent the silk moths from flying off. Silk worms possibly experience pain when their cocoon is dried in the sun, is exposed to hot water or steam or is being frozen. Due to genetic selection of silk worms, worms mutate and result in moths without wings ('flügellos').	Ahimsa Silk Organic Silk (Certified) Wild silk
Silk, organic (Certified)	yes	Animal origin	not available	not available	Low Risk	not available	**Animal Welfare:** Organic silk standards do not address animal welfare. They do however limit/prohibit the use of synthetic fertilizer and pesticides. Ahimsa silk (or Eri silk or peace silk) is harvested after the moth has left the cocoon. Wild silk is harvested from cocoons in the wild, often after the moth has left the cocoon. Bourette/tsumugi silk is made of the leftovers of the cocoon, after harvesting the outer threads of silk.	
Viscose/Rayon		Bio-based	E	23.8	not applicable	Level 1	**Environment:** Bio-based or regenerated fibres of cellulose origin, like viscose or rayon are often made of cellulose from tree wood. In order to produce viscose it is quite common to use strong chemicals such as sodium hydroxide (caustic soda) and sodium sulphide to produce wood pulp. This process also requires large amounts of water. Wood pulp is dissolved with caustic soda and carbon disulphide creating a viscous solution which is then purified and spun into fibres.	Ecovero by Lenzing
Ecovero by Lenzing	yes	Bio-based	not available	5.0 (Lenzing Viscose Europe) 14.7 (Lenzing Viscose Asia)	not applicable	not available	**Environment:** Lenzing Viscose & Lenzing Ecovero differs from other Viscose via Lenzings efforts to reduce and recover energy and via the aim to use pulp from certified forests (FSC or PEFC certified). All Lenzing production sites are ISO 14001 certified	
Wool, alpaca		Animal origin	not available	not available	Medium risk	not available	**Animal welfare:** The main producing country of alpaca fleece, Peru, has no animal welfare regulations in place. The main issues regarding alpacas is the shearing process (restraining and shearing) as this is immensely stressful for these animals as scientific studies have pointed out. This applies especially for female alpacas as they are heavily pregnant in the time slot when shearing takes place in Peru (usually around November).	Wool organic (certified) Wool Recycled (certified)
Wool, angora		Animal origin	not available	not available	High Risk	not available	**Animal welfare:** Angora rabbits are kept in small cages which limits their natural behaviour, deforms their spine because they cannot sit upright, and steel cages can cause foot ulcers. They can not move and occupy themselves appropriately by foraging and exploring, and behavioral disorders often develop, like stereotypies and physical aggression. Plucking is extremely painful and stressful, and can lead to injuries. Shearing also poses a risk of pain, stress and injuries, as the rabbit will fight fiercely to break loose from the restrains. Combing angora rabbits to obtain the loose hairs is possible, and is (very rarely) offered as 'ethical angora', at high prices and in low quantities. When rabbits are slaughtered unstunned, there is a risk of pain and stress.	Wool organic (certified) Wool Recycled (certified)
Wool, cashmere		Animal origin	not available	not available	High risk	not available	**Animal welfare:** Physical mutilations are a key problem. Removing horns can lead to long-lasting pain and brain damage. Slaughtering goats can take place unstunned, causing pain and stress. A lack of shelter can lead to physical discomfort and disease, and goats who are kept indoors are limited in exhibiting their natural behaviour. Goats can be transported over long distances without access to food and water, leading to hunger, thirst, pain, stress, and injuries. Most cashmere is produced in areas that are overgrazed, which reduces nutritional value of the forage and can lead to hunger and disease. for the animals and deforestation of the land can occure.	Wool organic (certified) Re.Verso
Wool, cashmere, Re.Verso	Yes	Animal origin	not available	not available	not available	not available	Re.Verso is made of post-factory waste. **Environment:** It has app 92% reduction in environmental impact when compared to virgin cashmere. **Animal welfare**: No specific requirements are set on animal welfare. Due to the fact that it is re-engineered material is reduces the demand on virgin cashmere. However virgin cashmere production is needed as re.Verso is made of its waste.	
Wool, cashmere, SFA		Animal origin	not available	not available	Medium Risk	not available	**Animal welfare:** Although SFA provides some improvements compared to conventional cashmere production, there are still concerns: disbudding/dehorning is allowed (although not practiced commonly), no mandatory pain relief during castration, and SFA possibly allows tethering of adult animals (unsure). The standard sets no long distance transport limitation (max hours). Furthermore it is not explicably demanded that animals are stunned rather than killed by blunt force trauma. SFA is not a certification scheme (yet). Companies can join the initiative, but it is not yet in the stadium of delivering certified sustainable cashmere wool.	
Wool, mohair		Animal origin	not available	not available	High risk	not available	**Animal welfare:** Due to its single-coat, angora goats are susceptible to rain and cold weather after shearing. A lack of shelter can lead to physical discomfort and disease. Mutilation such as castration and dehorning are often done without any pain relief.Removing horns can lead to long-lasting pain and brain damage. When grasslands are degraded, plants contain too little nutrition, and the goats can experience hunger and other physiological consequences. Rough handling is another concern. Goats can be transported over long distances, sometimes by boat, without access to food and water. Slaughter in South Africa itself often occurs under halal or kosher standards, where animals are only stunned after throat slitting, leading to stress and pain.	Wool organic (certified) Wool Recycled (certified)
Wool, organic	yes	Animal origin	not available	not available	Low Risk	Level 3	**Animal welfare:** organic standards linked to live stock and meat production consider animal welfare. Specific issues like handling, transport and slaughter are (not always) taken into account.	
Wool, recycled	yes	Animal origin	A	not available	not applicable	Level 4	**Environment and Animal welfare**: Recycled wool is produced with certified pre- or post-consumer waste. The environmental impact of recycled wool is less when compared to conventional wool because the livestock phase of wool is skipped in the process of recycling; the animal welfare and environmental issues at farm level are avoided. Recycling also reduces pressure on the global available area of farmland. The recycling process mainly involves transport, hand labour (sorting) and mechanical processing and is therefore more environmental friendly than conventional (virgin) wool. However, virgin material is often mixed in high quantities with recycled content, and the provenance and production circumstances of the virgin material is often unknown.	

Wool, sheep, merino		Animal origin	E	46.1	High Risk	Level 1	**Animal welfare:** A lack of shelter can cause physical discomfort in areas with extreme weather conditions; especially lambs are susceptible. Merino sheep sometimes get overheated and collapse due to the large quantity of wool they carry. Mulesing (mostly in Australia) can be avoided by using alternative methods or keeping systems, or breeding for sheep who are less susceptible to flystrike. Mutilations (f.e. tail docking, castration, mulesing) done without anaesthesia lead to pain, and can cause infections. Sheep kept indoors in individual compartments can experience stress. The long-distance transport of sheep by boat from Australia to the middle-east for slaughter is infamous because of the very poor conditions and high mortality rates. Slaughtering sometimes takes place without stunning, and ineffective stunning is also of concern. NWD & AWAX certificates are not sufficient. **Environment:** Wool scores poorly on GHG emissions due to the belching of the sheep. As sheep are ruminants, methane is expelled during their digestive process. Methane is a relatively potent greenhouse gas with a global warming potential 25 times more impactful than CO2.	Organic wool Patagonia Wool Standard Recycled Wool RWS (Responsible Wool Standard) Certified wool Animal welfare: Full chain of custody scheme, not permitting mulesing, no parallel production at farm level allowed. 100% of farms audited annually, incl. unannounced audits, combined with compliance to the Content Claim Standard. ZQ Merino (Animal welfare: Traceability to farm is a component of ZQ, and beyond farm is tailored to meet each client's supply chain needs; it can be combined with TE's CoC system. No parallel production at farm level allowed. 100% of farms are 3rd party audited, on a 3-year cycle as a minimum, plus additional random auditing and inspections.)
Wool, sheep, other		Animal origin	E	not available	Medium risk	Level 1	**Animal welfare:** most sheep live in extensive production systems, and stay outdoors permanently. A lack of shelter can cause physical discomfort in areas with extreme weather, especially lambs are susceptible. Overgrazing and high-density keeping systems can decrease the nutritional content of the grass, leading to hunger and disease. Sheep in barns are sometimes not fed enough, and indoor housing can also lead to stereotypical behaviour and health problems. Mutilations done without anaesthesia lead to pain, and can cause infections. Shearing is sometimes done roughly. **Environment:** Wool scores poorly on GHG emissions due to the belching of the sheep. As sheep are ruminants, methane is expelled during their digestive process. Methane is a relatively potent greenhouse gas with a global warming potential 25 times more impactful than CO2.	Organic wool Patagonia Wool Standard Recycled Wool RWS (Responsible Wool Standard) Certified Wool
Other Fiber			not available	not available	not applicable	not available		