Glossary

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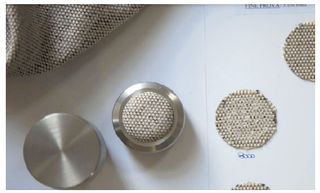
Abrasion



Abrasion refers to the degradation of a surface by a mechanical action of rubbing. The ability of a fabric to resist surface wear caused by rubbing with another fabric is a very important feature in the furniture industry; among the commonly used methods for testing abrasion, the most widely used in Europe is Martindale.

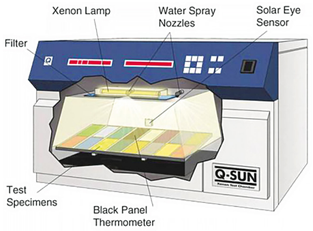
The Martindale Abrasion Tester was developed by J.G. Martindale in the early 1940s on behalf of of the Wool Industries Research Association in England. Uses an oscillating top plate that drags a circular specimen in a grouping of elliptical repetitive paths on a stationary abrasive fabric and under specific pressure. There are a series of 16 elliptical paths that change sequentially in a pattern known as the Lissajous figure.

Each path results in a cycle; The number of cycles the fabric can endure before exhibiting particular degradation is its abrasion resistance rating. For example, the test ends with the breakage of the specimen (by 2 or 3 threads), a loss of mass of the specimen, a change in the aesthetic appearance.

Classifying fabrics based on abrasion results allows fabrics to be compared for a particular application.
· Light Use: 5000 - 9000 Cycles
· Average use: 9000 - 18,000 cycles
· Heavy use: over 18,000 cycles

Reference Standards
UNI EN ISO 12947-2 Textiles - Determination of the abrasion resistance of fabrics with the Martindale method - Determination of deterioration of specimens.
UNI EN ISO 12947-3 Textiles - Determination of abrasion resistance of fabrics with the Martindale method - Determination of mass loss.
UNI EN ISO 12947-4 Textiles - Determination of abrasion resistance of fabrics with Martindale Method - Assessment of change in appearance.

Accelerated aging tests



The fundamental purpose of these types of tests is to evaluate the evolution of the physical-mechanical characteristics of materials over time; therefore, the change in the aesthetic appearance, the loss of finishing and lacquering treatments, the gradual degradation of fibers and yarns, the yellowing of plastic coatings, the variation of color tone, etc...to which all technical outdoor textiles are naturally subject.

Some of the most common accelerated aging techniques include:
· QUV Test
· Xenon Test
The two processes differ essentially in the use of different irradiation methods.
The QUV Test faithfully reproduces the damage caused by sunlight, rain and dew. In some weeks, you can reproduce the damage that occurs over months or years of outdoor exposure. It is a method that is very close to the conditions of real exposures, so it requires a long trial period.

To simulate the action of external weathering, the QUV tester subjects the materials to alternating cycles of UVA radiation (via 340nm fluorescent lamps) and humidity (via a induced condensation system) at controlled temperatures.

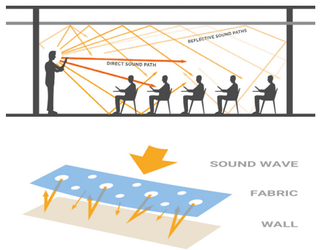
follow
Accelerated aging tests

The Xenon Test, on the other hand, is more suitable for determining the effect on the color of fabrics following the action of an artificial light source representative of natural light.
A sample of the fabric to be tested is exposed to artificial light under controlled conditions, along with a range of reference materials. Color fastness is assessed by comparing the color variation of the test sample with that of the reference materials used (Blue Scale or Gray Scale).

Direct radiation from xenon lamps contains considerable amounts of radiation short-wavelength ultraviolet rays not present in daylight. Optical filters are indispensable for minimizing short-wavelength light (less than 310 nm). Also
Infrared radiation levels can be attenuated by the use of filters to allow some control of the temperature of the sample. It's faster but also being stricter
It is mainly used as a comparative method.

Reference Standards
UNI EN ISO 4892-3 Plastics - Methods of exposure to laboratory light sources - Part 3: UV Fluorescent Lamps
UNI EN ISO 105-B02 Textiles - Colour fastness tests - Part B02: Colour fastness to light Artificial: Xenon arc lamp test
UNI EN ISO 105-B04 Textiles - Colour fastness tests - Colour fastness to bad weather Artificial - Xenon Arc Lamp Test

Acoustic comfort



A technical feature of some interior fabrics that allows, in accordance with specific application methods, to reduce reverberation and improve the acoustic comfort of a closed environment. Acoustic comfort is now a fundamental requirement for well-being within a space, whether public or private.

The guiding principles of acoustic comfort:
· The sound must be sufficiently loud.
· The sounds that follow one another with rapid emission must reach the listener clear and distinct while maintaining their individuality.
· The spectral components of a complex sound must maintain their relative intensities unaltered.

To achieve this we need to "cut" the reflected sound waves, which lead to the phenomenon of "reverberation". The textile membrane with these characteristics has the ability to absorb the sound wave through its penetration thanks to the porous conformation of the material.
The sound wave is then fractionated and trapped between the membrane itself and the back surface (wall or ceiling).

Specific application of these textile membranes to improve their efficiency, avoiding the use of materials with high thicknesses and where the overall dimensions allow it, e.g. false ceilings, is to interpose an air gap between the surface to be treated and the absorbent material, which must be placed at a distance from the surface (wall or ceiling) corresponding to the maximum amplitude of the sound wave. They can also be applied in combination with other sound-absorbing materials such as glass wool or technical felts.

Acrylic fiber - PC

Acrylic fiber is a man-made fiber composed of linear macromolecules that have at least 85% by mass of acrylonitrile units in the chain. It is produced from atactic polymers obtained by radical polymerization. Under the microscope, acrylic fibers have very different cross-sections: rounded, rounded with jagged contours, bean-shaped, dog-bone.

It has a very low specific gravity; good toughness, although lower than that of polyester and polyamide fibers; excellent elongation at break, almost equal to that of polyamide fibers (by 35-40%); a good elastic recovery (from 85% to 100%); a recovery of humidity of 1.5-2% (see also analysis).

The fibers are spun and woven following the same procedures as wool and cotton; not infrequently they are mixed with these. Produced with high orientation of the molecular chains obtained by stretching, it has excellent mechanical characteristics thanks to the CN groups with high polarity along the molecular chain. Due to the decomposition of the acrylonitrile polymer before melting, the fiber is not produced by melting but only by solution according to a spinning process that can be wet (more widespread) or dry.

Thanks to the presence of chromophore groups along the molecular chains, the acrylic fiber is easily dyed either with pigments or with basic dyes. With the latter, dyeing can take place directly during production (dyed in line) or on staple or yarn (discontinuous dyeing).
It is a light, soft, voluminous fiber, with a woolly and warm hand, unshrinkable and with a reduced Creasing.

Of all, it is the one that best resists UV rays, sun/heat, frost, rain, ozone, dirt, microorganisms, mold. It maintains very high resistance to outdoor exposure.
When we talk about acrylic fabrics for sun protection and outdoor furniture, we mean those fabrics produced from solution-dyed or solution-dyed acrylic fiber.

Acrylic coating

Coating of a technical fabric that is obtained by depositing a layer of acrylic-based resin by means of a doctor knife or calender on a base fabric (generally polyester). In this way, the fabrics acquire specific technical qualities: water resistance, microporosity, fireproofing, antistatic, but above all printability.

In fact, acrylic coating is very popular in the world of digital printing due to its tendency to fix pigments and its compatibility with inks. It also makes it possible to obtain very light fabrics, apply special finishes and has a high aesthetic result.

Acrylic lacquer

Finishing treatment for fabrics that consists of depositing a more or less heavy layer of acrylic-based resin on the surface of the material in order to increase the protection factor of the fabric in outdoor application. This standard lacquer leads to an advantage in terms of:
· Resistance to chemical aging
· UV and gamma radiation stability
· Excellent mechanical properties in tension and bending

Additives

As a rule, polymers are not suitable for processing in pure unmodified form, for example in the case of PVC there could be problems of degradation at the processing temperature of the same: for these reasons specific additives are used.
Additive is any substance that is generally added in small concentrations to resins in order to change their physical, chemical or electrical properties, and reduce raw material costs. They can be classified as process stabilizers, bulk mechanical property modifiers, fillers, surface character modifiers, optical modifiers, UV resistance modifiers, and many others.

Process Stabilizers
They prevent degradation caused by heat and oxygen as the latter combines with the polymer at high temperature to form carbonyl compounds that lead to yellowing of the matter, increased brittleness, loss of luster, cracking.
Among the various we find antioxidants (they inhibit or delay the oxidative degradation of materials by interrupting chain reactions and combining with free radicals to form a non-reactive product), chelating agents (they prevent degradation by metal ions present as impurities, fillers, initiators), heat stabilizers (they absorb and neutralize the hydrochloric acid that is generated during the reaction).

Lubricants
They reduce friction between the material and the machinery to produce it (adhesive forces) and reduce the heat generated and wear between two surfaces or between the polymer molecules themselves (cohesive forces) by changing the flow characteristics.
They differ into external lubricants (avoid adhesion to metal parts, form a thin film between the molten polymer and the metal surface, improve surface finish and gloss, help reduce melt viscosity) and internal lubricants (promote flow by reducing cohesive forces between molecular interfaces within the resin, improve polymer properties such as heat stability, impact resistance, color and clarity).

Plasticizers
They provide stability, modify the softening point, tensile strength, elongation at break. See “Plasticizers”.

Fillers
They are used to modify the mechanical properties of the polymer and to reduce its raw material costs. They cannot be used for transparent films.

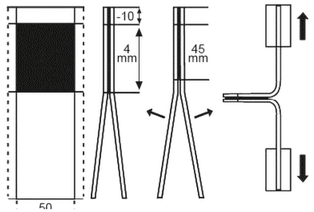
Antistatic
Used to limit the static charge that originates and can accumulate simply by friction with the ambient air. Since most plastics have low surface conductivity, the static charge is not discharged fast enough with dust attraction effect and discharges.

Gliding
They reduce the coefficient of friction, prevent adhesion between the surface of the film and itself.

Pigments
They give the desired color.

Anti-UV
They absorb or block UV radiation loaded with free radicals that accelerate the aging process of the polymer that would otherwise suffer harmful effects such as increased brittleness, color alteration, loss of elasticity, and other mechanical properties.

Flame retardants
They prevent polymer combustion and increase its self-extinguishing characteristics.
In this way, the final products can be used in environments with specific restrictions on in accordance with the regulations in force in the country of destination.



Adhesion

Adhesion refers to the ability of a thermoplastic coating such as PVC-P to remain glued to a textile support such as a polyester sweater. This adhesion strength allows to obtain a composite membrane in which the textile part gives the properties while the coating protects the internal reinforcement from external agents and dirt.

The adhesion measurement will then be the force required to separate two membrane portions joined by electro-welding (HF i.e. high frequency); a peeling action is carried out.

Reference Standards
UNI EN ISO 2411 Textile substrates coated with rubber or plastics – Determination coating adhesion

ADR

The world of logistics and transport is constantly evolving, both in terms of technologies and in terms of regulations and procedures to be followed. In the case of transport, in addition to international laws, there are also those of the country of destination and, in some cases, international laws or those of the European Union. This is even more true in the case of goods subject to ADR regulation.

This international agreement, signed in Geneva in 1957, regulated the transport and shipment of dangerous goods by road exclusively at international level. The acronym stands for “Accord européen relatif au transport international des merchandises Dangereuses par Route” and is written in French. Subsequently, a directive was incorporated into Article 168 of the The Highway Code has imposed compliance with ADR regulations also for national transport.

Regulating these transports has made it possible to safeguard the safety of all people involved not only in shipping, but more generally in the trade of these goods itself.
The legislation applies to all goods that fall under the definition of “dangerous”, categorizing them and regulating their transport according to safety criteria and proven procedures. The first part of the text is entirely dedicated to the procedures that the “shipper” (the one who makes the shipment independently or on behalf of a third party) must follow.

An important space is also dedicated to packaging and labels. In order to ensure total safety during transport, the packaging must be tailored to the goods and meet certain quality assurance requirements, and have an identification symbol. Markings and labels, on the other hand, use different symbols to identify the type of hazard, and must always be clearly visible on the means of transport, with a size predefined by the legislation itself.

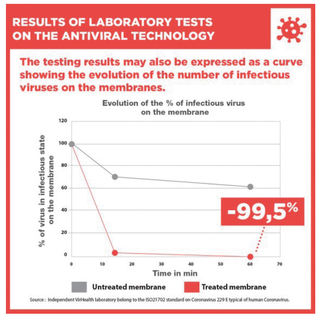
Finally, a chapter is entirely dedicated to documentation. The latter must have certain characteristics in order to be considered valid for any checks: for example, the number of packages, the description of the goods, the sender and recipient, and the total quantity of dangerous goods must be indicated. Specific labels must be affixed in the case of environmentally hazardous goods. In addition, all documentation must be kept after transport for a period of three months.

The shipper and the carrier are not the only ones who have obligations on them. In fact, the consignee must also comply with the regulations at the time of unloading. In particular, he is responsible for cleaning and decontaminating the vehicle used, in order to restore the original condition of the means of transport.

Fabrics for the manufacture of truck tarpaulins are sometimes referred to as ADRs as they meet the requirements of this regulation in terms of mechanical strength, durability and fire behaviour.

Agivir by Serge Ferrari

Treatment aimed at limiting the spread of viruses through surfaces.
The technology, based on the action of silver particles, prevents fabrics from becoming a source of propagation of viruses and bacteria, thus helping to reduce risks and the rate of contamination, keeping environments healthy.



Laboratory results
Serge Ferrari has successfully developed and patented a composite technology that **reduces the viral load by 95%** after a contact period of 15 minutes, and by 99.5% after one hour of contact, compared to an untreated membrane.

MULTIPLE APPLICATIONS FOR HEALTHY ENVIRONMENTS

Medical Applications
Modular facilities for patient care (fully equipped field hospitals, rapid deployment tents, etc.) or to temporarily increase storage and distribution capacity in hospitals with indoor fittings (partition screens, window curtains in hospital rooms), medical equipment (washable mattresses, stretchers, upholstery for medical furniture, etc.) and personal protective equipment (one-piece coveralls).

Public Applications
Facilities that are open to the public or have high levels of foot traffic, including schools, daycare centers, offices, retail stores, hospitality facilities, event facilities, and public transportation.

Air permeability

The air permeability of a fabric is the rate at which a known airflow passes through which It passes perpendicularly through a test tube under specific conditions of area, pressure drop, and time.

Air permeability is an important parameter for evaluating performance characteristics of fabrics in the technical field where the passage of air is not only allowed but also desired such as wind deflectors, filtering and shading items for side closures of pergolas and dehors, digital printing grids for large advertising surfaces on scaffolding and buildings that must allow air to pass through so as not to create the dangerous “sail effect” or for breathable fabrics for furniture.

It is measured as the flow (volume over time) of air passing through the known surface of a canvas by applying a fixed depression (10 mm/Hg) to the two faces of the canvas. It is generally expressed as Litres/minute/cm2 and therefore has the dimensions of a velocity (cm/min or mm/sec).

Reference Standards
UNI EN ISO 9237 Textiles. Determination of the air permeability of textiles.

Anti-Mold

In general, all fabrics (especially natural ones such as cotton and linen but also polyesters, acrylics and PVC coated) if subjected to particular conditions of humidity and heat dictated by the surrounding environment, undergo permanent damage due to the fact that some organisms (molds) attack them and feed on them. In fact, in the event that molds manage to affect the fiber, a mechanism of progressive degradation of the non-reversible fabric is triggered.

Biocidal products (disinfectants, preservatives, pest control and other applications) are normally used to prevent such damage, defined as “any substance or mixture consisting of, containing or capable of generating one or more active substances, with the aim of destroying, eliminating and rendering harmless, preventing the action or other controlling effect on any harmful organism, by any means other than physical or mechanical in nature.”

The marketing and use of biocidal products within the European Union is guaranteed and controlled by Regulation (EU) No. 528/2012 Biocidal Product Regulation – BPR, which aims to improve the functioning of the internal market through the harmonization of rules relating to the use of biocidal products, ensuring a high level of health protection human, animal and environmental impacts.

The bodies involved in the processes defined by the Reg. are the Competent Authorities of the States Members and the central authority ECHA – European CHemicals Agency.

Anti-Static

Synthetic fibers and plastic films, due to their hydrophobic character, have a reduced conductivity to electricity, so much so that they maintain an electrically charged atmosphere around them for a long time once rubbed with other bodies or with themselves.

To reduce electrical discharges, it is possible to operate in a controlled environment with a high humidity value, ionize the surrounding environment, reduce dynamic friction as much as possible or apply hydrophilic chemicals (anionic, cationic and amphoteric products). This prevents the formation of these static electric fields, which are responsible for attracting dust.
cause sparks or make it difficult to unwind (especially for plastic films).

The antistatic treatment consists of lacquers, additives and special finishes; surface electrical conductivity is measured with special instruments in order to meet specific conditions of use (e.g. ATEX Directive 2014/34/EU)

Reference Standards
DIN 54345-1 Testing of textiles; electrostatic behavior; determination of electrical resistance
EN ISO 80079-36 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements

Areic mass

Areal mass is defined as the mass per unit area and is determined by cutting a 1 dm² sample and then weighed.

Standards Reference
ISO 3801:1997, EN ISO 2286-2:1998 Methods for determination of total mass per unit area, mass per unit area of coating and mass per unit area of substrate

ATEX

Refers to two EU Directives that regulate the management of equipment and workplaces at risk of explosions. Where gases, dusts or vapors can be dispersed into the air, if these materials were to catch fire they could trigger explosions causing damage and injury.

ATEX aims to prevent this from happening. Industrial activities, from spraying vehicles to chemical production, from wood cutting to flour processing to filling stations, are just some of the work environments where explosions could occur. ATEX certification is intended to minimize or prevent explosions in these places.

If the production processes involve flammable combustible liquids, gases, aerosols or dusts, or if the equipment is used in such locations, companies must obtain ATEX certification. The term “ATEX” derives from the French Name of the 2003 Directive: ‘les appareils et les systèmes de protection destinés à être utilisés en ATmosphères Explosibles’. It covers both machinery or equipment intended to be used in these environments, as well as the rules for managing the general environment of these workplaces.

Artificial leather

Synthetic leather or imitation leather has a decidedly different nature from the better known leather and faux leather. It is a resinous or plastic material, synthetic, of petrochemical derivation and not of animal origin. It is a plastic in the basic form of a simple film or consists of a fabric such as nylon and polyester, or even natural such as linen and cotton, on which a polymeric material has been coated which can be PVC, PU, or a PVC/PU compound.

The production of this type of article is usually carried out by multilayer transfer coating: that is, the system involves about 4/5 different coating steps that deposit the various layers that will make up the final product (lacquering, adhesive, compound...). The different layers are spread with a doctor blade on a paper support and then transferred everything, in the last step, to the textile support.

This is followed by the process of finishing with printing, embossing, application of glossy papers if you want to enhance the aesthetic effect of the fabrics and all the other standard ones as desired.

Backlit

The peculiarity of a fabric suitable for backlighting is a high color rendering of the image when illuminated by an electroluminescent source placed behind the screen (which can be a fabric, a rigid plastic material, a display).

The purpose of the backlight is to make a message appear clearly that could otherwise be confused among a thousand different visual stimuli. Indoors, backlit modules designed to inform or promote are important to be seen and attract the user's attention. Outdoors, the dimensions will certainly be larger and the aim is to stand out with promotional or informative signage in the event of night-time events.

Therefore, a backlit fabric is recommended for the creation of totems, for signage in indoor and outdoor public places, for signs at trade fairs, for displays in stores or for embellish your home, or the shop itself, with paintings and accessories.

PVC coated fabrics are treated with a double layer of lacquer (both on the inside and on the outside), which consists of a layer of resin with different compositions (acrylic or polyurethane) and special (filled in PVDF and PTFE) to increase the protection factor of the membrane against atmospheric agents and outdoor exposure.

These lacquers protect and insulate the PVC layer, the resin is very stable and the materials processed in this way are used for textile architecture and industry thanks to their characteristics:

· Resistance to Chemical aging
· UV radiation stability
· Anti-dirt and anti-mold properties
· Excellent mechanical properties in tension and bending

Beam

Cylindrical support on which the warp (posterior beam) or the fabric produced (anterior beam) is wound.

Biocidal products

Biocidal products are defined as active substances or preparations based on a combination of these substances which are intended to destroy, eliminate, inhibit, render harmless, prevent the action or otherwise exert a controlling effect on any harmful organism by chemical or biological means.

This category includes disinfectants, preservatives, repellents and attractants, pest control, etc. In the world of outdoor textiles, it is common to use fungicides and generic antibacterials.
The use of biocides, in the field of safety for human health, is regulated by the European Regulation 528/2012 (BPR).

Biomass

A biogas plant consists of a complex system where anaerobic digestion processes of various types of substrates (animal manure, slaughterhouse waste, corn silage, sorghum and other biomass) occur by bacteria that metabolize the substances in the absence of air (hence the name anaerobic).

The result is the production of a gas composed mainly of methane, with the eventual production of electricity by combustion of the same.
Anaerobic digestion takes place through two steps: the first, starting from complex compounds, leads to simpler intermediates, the production of volatile fatty acids mainly acetic acid (acidogenic phase); In the second step (methanogens phase) other bacteria break down these acids into methane and carbon dioxide. Everything takes place at a controlled temperature that can range from 40°C (mesophilic) to 60°C (thermophilic).

Since biomass is composed not only of carbon-based compounds, but also proteins and other substances that contain nitrogen or sulfur, other gases such as NH_3 (ammonia) or H_2S (hydrogen sulfide) are also generated during digestion as reaction by-products.
These gases are particularly aggressive and corrosive and even if their concentration is kept low with various systems, the quantities left are sufficient to cause corrosion phenomena over time.

The main components of a biogas production and storage plant are the digesters, i.e. large containers in which the biomass undergoes fermentation processes.
Their covers must prevent air from entering, collect the gas without letting it out outside, absorb huge variations in volume and protect the digester from different climatic and atmospheric situations.

For the covers of these huge tanks, technical textiles and composite membranes coated in rubber or polyolefins are mainly used, but above all in special PVC resins, which not only have qualities of mechanical strength and elasticity but above all of resistance to the chemical agents that characterize the gas. In the table below is an example of the resistance that one of the most advanced sheets on the market has:

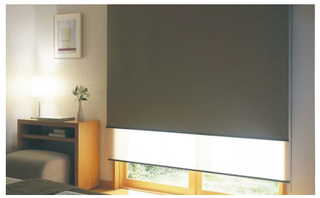
follow
Biomass

Chemicals		Max conc.	Resistance (+/-)
GAS	H_2O	100%	+
	Methane	100%	+
	Ethane	100%	+
	Propane...	100%	+
	Hexane		-
	Solfidric acid H_2S	0,5% Vol (5000ppm)	
Acids	Sulphuric acid	≤ 10%	
	Acetic acid	≤ 10%	
Foundation	Caustic soda	≤ 10%	
	Ammonia	≤ 20%	
Alcohol	Ethanol	≤ 30% (aq)	
	Isobutanolo	≤ 1% (aq)	
	Methanol		
Oils	Olive, soybean		+
	Lemon Essential		+
	Orange Essential		-
Solvents	Acetone		-
	Aromatic		+
	Terpenes (lemonones)		-
pH Range	4/5 - 11/12		

The cover can be single, so on the one hand the tarpaulin acts as a barrier for gas, on the other it protects from atmospheric agents resting on a central pole. More often, two sheets are used: a lower one dedicated to gas resistance, supported by the same gas that is released by the biomass, with a system of protection nets so that it does not sink into it when there is no digestion; the other upper one acts as a protection to the first inflated by fans.

The data vary from product to product depending on the application (double membrane, single membrane, tank, dome, flexible bag for storage) and the required resistance characteristics (to hydrolysis, to the passage of gases, to oils and grease, food-grade, low Wick, etc.).
Important for all are the characteristics of resistance to bacteria attack and flame resistance, as biogas is highly flammable.

Blockout



It is the specific characteristic of a textile material that does not allow the transmission of light.
It therefore acts as a total sunscreen.
It is achieved through additional layers of internal black coating or black bonded membranes.
that block solar radiation in a wavelength range between 400 and 700nm.
These special fabrics are used for covers, pergolas, roller blinds, screens for
video projection, etc....

BPR – Biocidal Products Regulation

The Biocidal Product Regulation (BPR) Reg. (EU) 528/2012) concerns the placing on the market and use of biocidal products, used for the protection of humans, animals, materials or articles against harmful organisms, such as parasites or bacteria, through the action of the active substances contained in the biocidal product.

The aim of the regulation is to improve the functioning of the market for biocidal products in the EU, while ensuring a high level of protection for humans and the environment.
The text was adopted on 22 May 2012 and will apply from 1 September 2013.
with a transitional period for certain provisions. The regulation will repeal the Directive on biocidal products (Directive 98/8/EC).

All biocidal products require an authorisation before they can be placed on the market.

The active substances contained in them must have been previously approved. There are, however, some exceptions to this practice. For example, biocidal products containing active substances subject to the review programme may be made available on the market and used (subject to national regulations) pending the final decision on the approval of the active substance (and up to three years thereafter). In addition, products containing new active substances that are still under evaluation can also be placed on the market on the basis of provisional authorisations.

The objective of the BPR is to harmonise the market at Union level, to simplify the approval of active substances and the authorisation of biocidal products, and to introduce deadlines for evaluations, opinions and decision-making at Member State level. It also promotes the reduction of animal testing by introducing data sharing obligations and encouraging the use of alternative testing methods.

By-product

A by-product and not a waste is any substance or object that meets all of the following conditions:

· The substance or object originates from a production process, of which it forms an integral part, and the primary purpose of which is not the production of that substance or object;

· It is certain that the substance or object will be used, in the course of the same or a subsequent production or use process, by the manufacturer or by a third party;

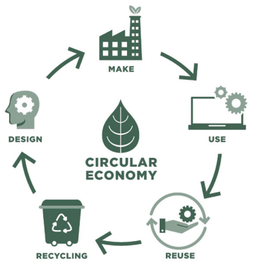
· The substance or object can be used directly without any further treatment other than normal industrial practice;

· Further use is legal, i.e. the substance or object satisfies, for the specific use, all relevant requirements regarding products and the protection of health and the environment and will not lead to overall negative impacts on the environment or human health.

Carbon footprint

The carbon footprint is a measure that expresses the total greenhouse gas emissions generally expressed in tons of CO2 equivalent associated directly or indirectly with a product, service or organization.

Circular economy



An economy designed to be able to regenerate itself, both in terms of biological and technical flows. From the point of view of materials, a circular economy is achieved by introducing actions to improve the efficiency in the use of resources and prevent or reduce the negative impact related to the generation and management of waste, through the recycling of waste as well as the reuse of production and processing waste, allowing its enhancement and continuous innovation. These actions are believed to be effective in reducing Europe's dependence on imported raw materials and improving the overall environment and the well-being of citizens.

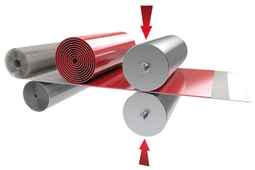
CLP – Product labeling

On 20 January 2009, Regulation (EC) No. 1272/2008 (CLP Regulation for Classification, Labelling and Packaging) on the classification, labelling and packaging of substances and mixtures came into force. Together with REACH, CLP completes the revision of the European legislative system on chemicals.

Trade in substances and mixtures affects not only the internal market, but also the market worldwide. To promote world trade and at the same time protect human health and the environment, harmonized criteria for classification and labelling and general principles for their application have been carefully defined within the framework of the United Nations (UN) structure over a period of 12 years. The result has been called the Globally Harmonized System of Classification and Labelling of Chemicals (UN GHS).

The hazard of a substance or mixture is the potential of that substance or mixture to cause harm and It depends on the intrinsic properties of the substance or mixture. In this regard, the assessment of the Hazard analysis is the process by which information regarding the intrinsic properties of a substance or mixture is evaluated to determine their potential to cause harm.

In cases where the nature and severity of an identified hazard meet the classification criteria, hazard classification is the attribution of a standardised description of this hazard of a substance or mixture to cause harm to human health or the environment. Hazard labelling makes it possible to communicate the hazard classification to the user of a substance or mixture, to warn the user of the presence of a hazard and of the need to avoid the exposures and risks arising from it.



Coating

The process used to cover, using thermoplastic materials such as PVC, PU, silicone, polyolefins, rubbers and others, a woven or non-woven textile substrate (nylon, polypropylene, polyester, polyamide, cotton, wool), to improve and modify the physical properties and appearance.

With this operation, what is obtained is a technical textile with properties of resistance to chemicals, dirt, making it almost impermeable to gases and water vapour. Other characteristics that vary after coating are thermal and electrical conductivity, waterproofing and increased abrasion resistance. The coating can also generate a smooth printable surface and contain loose substances that increase flame resistance.
Some coating methods can be identified:

Direct coating
The paste of coating material, e.g. PVC and additives, is applied directly to the fabric, making it adhere evenly, by means of blades (knife coating) that adjust the thickness of the paste layer. The operation can be repeated several times, depending on the desired resistance result or desired characteristics.
Applications: sheds and trucks roofing, textile architecture, advertising banners, etc.

Online coating
The towel is immersed directly from the frame in the opaque bath.
Applications: geotextile grids, windbreaks, etc.

Melt coating, lamination
A film of the desired thermoplastic material is first produced and then laminated on a support that can be a sheet, a non-woven fabric, a felt, etc.
Applications: ventilation pipes, special tanks, etc.

Comb

Structure of part of the frame similar to heddles, but without eyelets. Between its teeth all the warp threads pass, and its function is to beat the weft thread to compact the weave.

Condensation

Condensation is a physical phenomenon that occurs when water vapor comes into contact with a cold surface. The air that surrounds us is made up of a mixture of elements and a certain amount of water vapor that is formed due to the evaporation of water in the environment.

The air absorbs water vapor to the point of becoming saturated; Under such conditions, its volume and specific gravity also increases. The higher the temperature, the more pronounced this phenomenon becomes. To give you an idea: 1 m^3 of saturated air, at sea level, contains 4 g of water at 0°C, 18 g at 20°C, 55 g at 40°C and almost 95 g at 50°C. As it cools, the air returns to its original volume and then the vapour is expelled which, if the cooling is very rapid, such as the impact against a colder surface, condenses and turns into drops of water.

These droplets, which are deposited on the cold surface, are also called dew, because the temperature at which this transformation takes place is called the dew temperature.
The condensation phenomenon is observed and is most evident on very compact, i.e. non-porous, materials such as plastic and metal surfaces, glass, ceramics and on rainy, foggy and snowy days.

If not remedied in the short term, condensation could create an environment conducive to mold growth. Practical advice to avoid condensation and therefore mold is to maintain the right balance between temperature and humidity, then ventilate the rooms correctly.

Color fastness

The quality of an ennobling treatment is defined not only by the effects obtained, but also by the Their durability and strength: the dye will have very little value if it degrades early.
The finishing must take into account all these factors and for this reason all fabrics are subjected to rigorous tests to prove their resistance and quality of treatment; besides There is continuous research and development work to improve the processes currently in use, making them more durable or easier to perform.

Color fastness is the ability to withstand the action of external agents, not only during washing, but also in daily life, such as for sun, sweat, humidity, stains, ... A mediocre dyeing treatment not only compromises the color of the fabric in question (degradation), but also dirties the other garments during washing (unloading, understood as migration of the dye on adjacent fibers).

The colour fastness is determined in the laboratory, subjecting the garments to various UNI EN ISO standardised tests, each of which is aimed at assessing its resistance to a certain Stress: the results are then compared with specific classification methods that evaluate the quality of the dyeing treatment, from 5 (best outcome) to 1 (worst outcome), from 8 to 1 depending on the legislation used.

These tests include:

Dry and wet rubbing: to test the discharge of the color of the fabric: rub a white cotton cloth on the garment, first dry and then wet, and see how dirty it has become; If it happens, it is an indication of dye that is not properly fixed, due to its excessive use or errors in the fixing phase.

Sweat and water: the discharge of the color of the fabric occurs under certain conditions: in this case is soaked in water or artificial sweat and is pressed by a special tool (perspirometer) against a reference fabric, verifying the migration of the dye under static contact conditions with lighter materials.

Washing in water: repeated washes are carried out following the instructions of the reference; In this case, both degradation and discharge of the color of the fabric can occur.

Artificial light: An artificial light is used to simulate the action of the sun, accelerating the process of observing its effects in the long term: to do this, a light source with a spectral composition equivalent to that of the sun, but more intense, is chosen.
to Xenon. The results of this test are evaluated on the blue scale instead of the gray scale for degradation, with an index ranging from 8 (best result) to 1 (worst result).

Reference Standards
ISO 105-B02 Color Fastness to Artificial Light: Xenon Arc Lamp Test
ISO 105-B04 Colour fastness to light and weather
ISO 105-C12 Colour fastness to industrial washing
ISO 105-E02 Colour fastness to seawater
ISO 105-E03 Colour fastness to chlorinated water (swimming pool water)
ISO 105-E04 Color fastness to sweat
ISO 105-X12 Colour fastness to rubbing

Colour fastness to light

Colour fastness refers to the assessment of the variation or loss of the original colour of a dyed or printed sample to different altering agents to which textiles may be subjected, during their use. Colour fastness is particularly important because it plays a significant role in defining the quality of the textile material.
The quality of a dye also occurs in the fastness of the dyes.
The various test methods are described in a collection of standards referred to as ISO 105.
As far as technical textile fabrics are concerned, the evaluation of the stability test under artificial light that reproduces the effects of exposure to sunlight (EN ISO 105 B02/B04) is very important.

Standards Reference
ISO 105-B02:2013 Colour fastness to artificial light: Xenon arc fading lamp test.
This document describes a method for determining the colour fastness of textiles of any nature and in all their transformation phases under the action of an artificial light source, representative of natural daylight (D65). The method involves the use of two different sets of blue wool references.

Instrumentation
Luminaire with xenon arc lamp, cooled

1. air, consisting of the following components:
· Light source: Xenon arc lamp with a color temperature between 5500 and 6550 K, placed in a well-ventilated exposure chamber.
· Light filter to reduce ultraviolet radiation.
· Heat filter, to reduce infrared radiation.

2. water-based, consisting of components as described above, but equipped with cooling systems placed between the walls of the light and heat filters.

Sample Scales
Two different sets of references can be used:

Sample scale from 1 to 8 (preferably used in Europe). The sample scale consists of 8 strips of blue-dyed woollen fabric, numbered from 1 (very weak lightfastness) to 8 (very high lightfastness) and formed so that each strip has approximately twice the fastness of the strip preceding it.

Sample scale from L2 to L9 (preferably used in America). Built with a similar criterion to the previous scale, but using different dyes (L2 – very weak lightfastness; L9 – very high lightfastness).

Test Procedure

Test tubes taken from fabric or wound wire must be 4.5 cm x 1 cm for the air-cooled appliance, while they may be larger (up to 7cm x 12cm) for the water-cooled appliance.

follow
Colour fastness to light

Assessment Method

The test tubes and the sample scale are then exposed for a sufficient time to evaluate the lightfastness of each test tube in relation to the sample scale, according to different procedures (the sample scale taken into consideration is the scale from 1 to 8). There are various exposure methods in which a screen, or several screens consecutively with a slit for light to pass over a single given area, is applied both to the sample to be examined and the reference.
Methods vary for the type of shield and the duration of the shielding, and whether it exposes only one sample for each reference scale or multiple samples of different colors for each reference.

ISO 105-B04:1994 Colour fastness to artificial weathering:

Xenon arc fading lamp test
This document describes a method for determining the colour fastness of textiles to the action of weathering, determined by exposure to simulated weather conditions in a cabin equipped with a xenon arc lamp. The instrumentation and sample scales are the same as those of ISO 105 B02

Test Procedure

Blue wool test tubes and references are simultaneously exposed in the equipment, test pieces to light and water spray, and references to light only. The temperature of the test chamber should not be higher than 40°C during the drying period.

Test tubes should be exposed to the following weather cycle:
· Spraying time: 01 min
· Drying time: 29 min

The tubes should only be sprayed with deionized water. Tubes must be mounted on appropriate supports. The blue ladder must be mounted on a stand with a glass protection to protect the ladder from splashing water. The standard then describes the 3 exposure methods and one method of robustness assessment.

Cotton - CO

Cotton is a natural fiber and is one of the most used fibers by humans along with wool. The fiber, used for textile production, is very long, soft, extremely shiny and is obtained from the dense fuzz that surrounds the seeds of the plants. These hairs are made up of pure cellulose and that's where the fibers come from. Cotton has a 95% cellulose composition and is a lightweight, soft and high absorption properties.

If you look at the fiber under a microscope, you can see how has a ribbon-shaped spatula shape, with spiral convolutions and with two endings. The windings are frequent and regular in good quality fibers. Fundamental property of the Cotton is the marked toughness (breaking strength when a force is applied lengthwise of the fiber) due to its crystallinity, especially in a humid environment, where the strength of cotton fibers increases by up to 15%. On the other hand, its elasticity is poor, although higher than that of all other plant fibers. Excellent hygroscopicity (the ability to readily absorb water molecules present in the surrounding environment) is combined with medium insulation (thermal conductivity).

In order to improve or enhance certain characteristics of cotton products, special processes such as:
· Sanforization: to obtain a fabric with a shrinkage of less than 1%, a series of washing, pressing and drying
· Mercerization: through this treatment, the fiber is given a shiny appearance and a permanent shine as well as great tensile strength, increased elasticity and a higher affinity with almost all colouring substances.

Cradle to Cradle

(also known as cradle-to-cradle, "C2C" or "regenerative design") is an innovative and sustainable approach to making products. C2C models aim to create a sustainable system that is respectful of life and future generations – as can be seen from the name, birth, or "cradle" of one generation to the next. In industry, especially in the United States, C2C is widely used and companies often obtain Cradle to Cradle® certification to have a competitive advantage in terms of Brand Reputation over the competition.

CAM

The Minimum Environmental Criteria (CAM) are the environmental requirements defined for the various phases of the purchasing process, aimed at identifying the best design solution, product or service from an environmental point of view throughout the life cycle, taking into account market availability.

The CAMs are defined within the framework of the provisions of the Plan for the environmental sustainability of consumption in the public administration sector and are adopted by Decree of the Minister.

Their systematic and homogeneous application makes it possible to disseminate environmental technologies and environmentally preferable products and produces a leverage effect on the market, inducing less virtuous economic operators to invest in innovation and good practices to meet the demands of the public administration in terms of sustainable procurement.
In Italy, the effectiveness of the CAM has been ensured thanks to the provisions contained in the Code of Contracts. In fact, Article 57, paragraph 2 of Legislative Decree No. 36 of 31 March 2023, provides for the obligation to apply, for the entire value of the tender amount, the "technical specifications" and "contractual clauses", contained in the Minimum Environmental Criteria (CAM). The same paragraph provides that the CAM must also be taken into account for the definition of the "criteria for the award of the contract" referred to in art. 108, paragraphs 4 and 5 of the Code.

This obligation ensures that the national policy on green public procurement is incisive not only in the objective of reducing environmental impacts, but in the objective of promoting more sustainable, "circular" production and consumption models and in increasing the number of employees in the different sectors of the most sustainable supply chains.

Cytotoxicity

An analysis designed to assess the general toxicity of medical materials and devices, which involves extracting the devices into a cell culture medium and subsequently exposing the extracted fluid to mouse fibroblasts. This test is performed on all materials that come into contact with patients, raw materials, and medical devices.

Direct sublimation printing

The sublimation process, in the digital printing sector, is the transformation that inks undergo when, coming into contact with heat, they turn into gas (sublimate) and join in a stable way to the polyester surface. Sublimation is carried out using inkjet printers equipped with sublimation inks, using a special sublimation paper. The ink received from the paper is transferred to the receiving surface with a special press. Sublimation printing is used for printing on polyester fabric and pre-treated materials based on polyester and nylon.

Disbursement

The difference in % between the length of the warp and the length of the fabric obtained.

Double-sided printable

In digital printing, fabrics are defined as double-sided because they are printed on both sides. To ensure image quality without transparency defects when illuminated, these materials are produced by means of a double black internal coating that is intended to block the transmission of visible light through the fabric. The applications of double-sided fabrics are diverse: banners, signs, billboards, exhibition stands.

Dyes & Dyeing

Dyes are substances capable of imparting color to various materials through molecular interactions which allow the dye itself to fix stably on the materials.
The dyeing behavior of a dye, however, is not only characterized by the spectral light absorption functions. Above all, it must be absorbed into the fibers to which it is applied (affinity) and remains firmly attached to it (solidity). Exhausted process dye (under suitable conditions) no dye residue should remain in the bath (hiding power), if not in minimal quantities. The dye should also be the most specific for that fiber so as not to dye different or 'close' fibers in case of poor solidity (power migratory migration).

Dyes can be divided into natural and synthetic (or artificial) dyes.
They were of both animal and plant origin. The purple red was extracted by the Phoenicians from small Mediterranean mollusks. To date, they are no longer usable given the enormous cost and impact environmental. Synthetic dyes are a few tens of thousands of them and offer, compared to those Natural, enormous advantages in terms of colour tone, fastness, hiding power and costs.

Are marketed in various forms: in powder, in pieces, in crystals or paste.
With reference to the mechanism by which the colouring substances are absorbed and fixed on the fibres, We will have direct (color baths), indirect (by reduction, with a process of two-phase fixing and transformation), stained (with the use of metal salts to create a lacquer) or solvent-based (dyes dissolved not in water, but in solvents).

Dyeing can then take place at different stages of the textile supply chain, in terms of decreasing quality of the general color fastness:
· Paste dyeing when dye is added before fiber extrusion (acrylic and polyester);
· Yarn dyeing (cone) when the yarn (placed on the packages) is dyed;
· Piece dyeing when the fabric is dyed.

DSC

Differential Scanning Calorimetry. A test that exploits the energy exchanges between the tested polymer and the external environment to evaluate thermal characteristics and phase changes.

EasyCare

As a consequence of the different textile ennobling treatments that involve the application of fluorocarbon resins, anti-mould additives, dressings or softeners on fine fabrics in solution-dyed acrylic for sun protection and indoor & outdoor furniture, the result it is a "technical" fabric that resists wear and use over time.

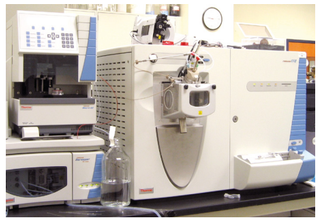
Textile fiber is like this better protected and preserved, so that all cleaning and maintenance operations are also facilitated thanks to a set of specific detergents designed specifically for the for these items, thus ensuring that the technical characteristics are maintained over time Original.

Ecobau

Certification that sets the standard for healthy and environmentally friendly construction in Switzerland. The inclusion of products in the ECO-BAU database helps planners to quickly find the right products for sustainable construction of buildings in Switzerland. The assessment is based on the ECO-BAU "methodology", which takes into account aspects such as the energy used over the entire life of the product, emissions from pollutants, critical components from the point of view of health and disposal of the product.

The ECOBAU assessment results in the classification of the product into one of three categories: "eco-1", "eco-2" and "basic". The evaluation is mainly based on safety data sheets, technical data sheets, laboratory analyses and product labels."

Ecotoxicological analyses



Currently, the greater sensitivity to the issue of the environment and respect for human health has led to particular attention to the evaluation and verification of the ecotoxicological characteristics of products throughout the textile supply chain. The requirements are not always the same, they change according to the specific regulations with reference to the end use and the limits provided for by the various regulations, marks or quality labels (REACH, OekoTex®, Ecolabel®...). Below are some of the substances and classes of substances most frequently investigated in the analyses ecotoxicology carried out on fabrics.

Free, extractable and released formaldehyde: it is an extremely volatile organic substance and is highly irritating by inhalation, to the point of causing dermatopathies. Formaldehyde can be present in the textile cycle for the use of the following products: crease-resistant finishes, fixers of coloring matter, binders for pigment prints...

Azo dyes that can release dangerous aromatic amines: the presence of these aromatic amines in the dye molecules is considered potentially harmful to health. Today they are found only in cases of use of "prohibited" coloring matter.

Heavy metals: in textiles and their production cycles, due to their generalized toxicity and heavy environmental impact, they are monitored with increasing attention, especially in intermediate processing cycles. The presence of heavy metals causes strongly negative effects on the metabolism of many living beings (metabolic poisons and carcinogenic characteristics), as well as allergenic effects, as in the case of nickel.

Pesticides, herbicides, pesticides present in natural fibers such as wool and cotton, in fact residues of these substances can come mainly from the cultivation of cotton and from the pesticide treatments that are periodically carried out on sheep.

Phthalate plasticizers related to the use of PVC as a plastic material in the production of children's products and toys and in food films. All this is linked to the migration, and consequently to the ease of contact intake of certain classes of phthalates (only some are harmful), which are used as plasticizers of PVC.

Volatile Organic Solvent Emissions: sometimes referred to as (VOC = volatile organic compound) they are generally made up of aromatic solvents derived from benzene (toluene, xylene, etc.). They are very volatile molecules that, if absorbed in quantity, can cause nervous system disorders and kidney problems. VOC analysis is considered limited to textiles for indoor applications.

Embossing

Embossing is an operation of ennobling textiles by means of which a design on the surface of the fabric, using special calenders with engraved cylinders capable of reach high temperatures. The effect obtained on the surface of the textile material is permanent.

Embossed fabric is also called "embossed" because of its similarity to the embossing technique wall cladding that has been used since ancient times on stone blocks to obtain on them an effect very similar to that obtained with embossing on fabrics. Such processing is often carried out on PVC-coated membranes to give a visual effect of nature "textile" and on imitation leathers to improve and differentiate aesthetically the various products.

Energy parameters

In order to evaluate the thermal heating effect of a radiation, which includes the entire spectrum considered on a body (a wall, a window, a sheet) and on a curtain or a textile that protects it, the following parameters have been defined:

Solar (thermal) transmission TS
The part of the radiation that is transmitted directly can have values between 0 and 1 or in percentage between 0 and 100 transmission.

Solar Reflection RS
It refers to the part of the total solar radiation reflected by the surface of the body, it can have values between 0 and 1 or in percentage between 0 and 100 of reflection.

Solar assorption AS
It refers to the portion of total solar radiation absorbed (theoretically remittable) by a body. Again, it can have values between 0 and 1 or as a percentage between 0 and 100 absorption. Absorption depends on the mass and characteristics of the material that makes up the body. The three parameters summed for any radiation are equal to one. Given two of them, the third can be derived, usually AS.

Environmental label

Environmental labeling consists of identifying all packaging placed on the Italian market, to indicate its composition, facilitate its collection, reuse, recovery, recycling and correct disposal by the consumer. Legislative Decree No. 116 of 3 September 2020 provides that all packaging must be "appropriately labelled in accordance with the procedures established by the applicable UNI technical standards and in accordance with the determinations adopted by the Commission of the European Union". By "appropriately labelled" we mean in the form and in the ways that the company considers most effective to achieve the established goal.

Directions can be reported in one or more of the following ways:
· Directly **on the packaging**
· iThrough **digital channels** (Apps, QR codes, websites)
· On **transport documents** or other documents that accompany the goods (in turn, these documents can link to digital channels)
· On **instruction booklets** or **user manuals**
· On **information boards** at the point of sale

EPD (Environmental Product Declaration)

EPD®
THE INTERNATIONAL EPD® SYSTEM

Voluntary certification that allows the calculation of the environmental impact of products and services.
This certification is used to demonstrate that the verified products comply with the CAM (Minimum Environmental Criteria), and therefore have the technical characteristics necessary to participate in tenders/tenders issued by the public administration; It also certifies the percentage of recycled material of the materials used for construction and construction work, which are essential for accessing some state bonuses.

Online shopping platforms also select manufacturers/sellers through very strict sustainability criteria, rewarding those who offer goods with low environmental impact, and EPD certification allows you to pass sustainability tests to access digital sales channels.

ESG (Environmental, Social, Governance)

Indicates a real rating, often known as a sustainability report, which expresses the environmental, social and governance impact of a company or organization operating on the market. It is an index that also allows investors to have a greater understanding of a company's sustainability and its exposure to risks related to environmental, social or governance issues. ESG extends the concept of "traditional" sustainability of a company, represented by economic sustainability and the ability to generate new value for investors, to the concept of **sustainability towards society** and the **environment**, together with the ability **to generate new value** for shareholders, the environment and society.

The ESG rating consists of a series of factors that make it possible to express an assessment also with regard to the **risk and performance profile** of an investment in relation to the level and type of impact of a company. All in relation to the type of market in which it operates, the strategies and design initiatives that distinguish it.

E for Environmental concerns the relationship with the environment and includes initiatives and operations aimed at measuring and reducing the environmental impact of companies and monitoring and limiting the risks related to climate change. The "E" for Environmental also covers the impact issues related to respect **for biodiversity**, sustainability at the level of **the food chain, agri-food security**, attention to population growth and the ability to meet food needs and in general the management of resources such as water, land, air, vegetation. The measurement and reduction of **CO2 emissions** is one of the main themes and benchmarks of the E category of Environment.

S for Social refers to all corporate and organizational decisions and activities that have a social impact, such as **respect for civil and labor rights**, such as attention to working conditions, gender equality, the fight against all forms of discrimination, the ability to contribute to the development of the social fabric and the territory in which the company works through initiatives that increase its well-being and that allow to improve the quality of life of the inhabitants.

This also includes issues such as combating the use of child labour, and for organisations with complex supply chains, this means having important control over all the players that make up the **supply chains**.

G for Governance concerns the strategies and decision-making choices of companies and organizations in terms of remuneration ethics, compliance with the rules of meritocracy, respect for shareholders' rights and the fight against any form of corruption, and compliance with the rules in the composition of the Board of Directors.

Governance is representative of the **identity of the company**, the organization, the strategy, the attitude and the determination with which it aims to implement ESG principles, i.e. the ability to define organizational forms and concrete actions that are in all respects in a position to implement these principles on a daily basis.

In the past, many companies had in mind objectives related to ethics, inclusion, the enhancement of good practices and attention to social issues, but these were left to the "good will" of the owners and management, they certainly inspired the strategies and actions of companies, but on the basis of a "discretionary" approach.

The Governance that feeds ESG parameters pertains to organizational models in which these principles are **an integral and substantial part of the company's "mechanisms"**. They are a **strategic choice equipped with means, resources, objectives and control tools** so that it can be implemented to all intents and purposes.

Ethylene tetrafluoroethylene - ETFE

ETFE is a fluoropolymer, which is a polymer rich in fluorine atoms.
Its main characteristic is that the molecules that make it up are very stable (thanks to the to the Carbon-Fluorine bond), able to withstand high levels of thermal stress and chemical aggression, more than other polymers. On the other hand, their cost is high.

The possible applications of this material, given its extraordinary properties, are very wide: insulation of cables, electronic supports, cells of photovoltaic systems, as an acoustic insulator, in aerospace applications and for the automotive industry.

Since the 80s it has also been used in architecture, because it allows the creation of envelopes totally permeable to light and UV rays; It is possible to design covered spaces, which maintain the lighting conditions of open spaces, thus favoring the growth of plants and animal life (greenhouses, zoos, sports facilities).

The use of ETFE membranes, as tensile structures or as pneumatic elements (air chamber), provides a certain level of thermal insulation, which can be increased thanks to the addition of additional layers of material.
In addition, it is an elastic material, unlike, for example, glass, so the noises produced inside the rooms they are not reflected, avoiding annoying reverberation or echo phenomena.

This ensures greater acoustic comfort for users, especially in the case of covers dome-shaped or spherical, for which the reverberation effect of the envelope towards the fires geometric, leads to amplify noises a lot. ETFE is a low-flammability material: in the event of a fire, the membrane becomes more flammable.

soft until it is punctured. By raising the temperature further, the membrane melts, but does not drops of incandescent material; it also tends not to cause the fire to spread,
Special property of fluorine compounds.
The ETFE membrane is environmentally sustainable, as it is 100% recyclable.

Fabric

Textile product with a flat surface, made through the processing of threads or yarns. Fabrics can be divided into three macro-categories: orthogonal fabrics, knitted fabrics and non-woven fabrics (TNT). Orthogonal fabrics are made on different types of looms, classified according to different heights and the number of levels of selection (how many heddles they can mount, how many weft threads they can use in processing, ...).

They are composed of a warp, which will determine the length of the fabric, and a weft, which will define its width. In the most basic process, i.e. the weaving called canvas, the even-numbered warp threads are separated from the odd-numbered ones by threading them into two different heddles. The alternating movements of the heddles create an opening through which the weft thread will be passed.

This will be beaten by the comb, the heddles will reverse the position creating a new opening, where a new weft thread will be inserted, giving life to a stable and compact weave of threads. These movements will be repeated along the entire length of the warp, making the fabric (e.g. denim, tartan, satin,...).

Knitted fabrics are produced on particular looms or knitting machines. They are made by working with a single thread or yarn, and are distinguished between knitting fabrics in weft or chain, based on the direction of development of the meshes that compose them. In weft knitting, the stitches are formed horizontally, feeding a series of needles, arranged vertically on a grooved support called a bed, which move by rising and falling to knit the thread. In chain knitwear, on the other hand, the development of the stitches is vertical, each needle is fed by a different thread and a more static and warp-knit fabric is obtained.

Nonwovens (TNT) are textile products in which the fibres have a random pattern, unlike fabrics. Manufacturing typically uses fibers arranged in layers or criss-crossed that are joined together mechanically, with adhesives, or by thermal processes. Non-woven cotton wool (wadding) and felt are non-woven fabric.

FDES (Fiche Déclaration Environnementale et Sanitaire)

Certification that concerns building products for the French market and describes the environmental and health performance of a construction product.

Filter

It is the characteristic of particular fabrics that, thanks to their micro-perforated construction, allows you to shield the sunlight avoiding glare phenomena and at the same time allows you to the passage of a portion of natural light, in order to illuminate the rooms with numerous advantages.

In addition, their protective function does not only concern direct sunlight, but also the ability to reflect UV rays, which are harmful both to the human body and to all objects and furnishings in the home (they degrade plastics, discolor dyed fabrics).
During the day and evening, these fabrics allow you to look outside without being seen inside, thus fulfilling a very comfortable and pleasant feeling of privacy protection.
They are the best tents not only for certain rooms in the home, but also and above all for offices, conference rooms, commercial premises, restaurants and bars.

Finishing

This term refers to a series of treatments to which textile materials are subjected:

Dyeing: transfer of pigments or dyes from the batch to the product, so that it is evenly distributed and firmly fixed.

Printing: a localized dye with one or more colors, generally used with fabrics that allows you to create writings or drawings.

Finishing: the term finishing refers to the set of operations for the ennobling of a fabric, in order to improve its appearance, the hand, the properties and the possible applications. Finishing operations can be carried out through mechanical action, with the use of chemicals or with the use of resins or silicones in the form of microfilm; all with the aim of bringing quality and characteristics to the various textile materials such as to guarantee optimal behavior in the manufacture and during use. The most common treatments include: antibacterial, anti- and oil-repellent stains, anti-mould, antistatic, self-cleaning, waterproofing, lamination, resining, calendering, embossing, coating, fireproofing, etc.

Flapping

A situation that occurs when a fabric, poorly tensioned or not tensioned, is subjected to the constant action of the wind or to continuous oscillations.
This phenomenon is particularly harmful for coated fabrics, as, during the course, it creates more or less evident cracks in the coating, which can sometimes even crumble exposing the internal textile weave.

Fire Retardant - FR

FR certified fabrics are:

Surface treated with a process of immersion or coating with flame retardant chemical additives after the canvas has been woven.
All cottons and natural fibers certified as flame retardants undergo this type of treatment.
Along with them also some synthetic fabrics. Because the treatment is superficial and many of these additives have some solubility in water or dry cleaning detergents: the flame retardant properties of these fabrics can decrease significantly over time.

Other PVC fibres, films and coatings can be flame retardant by mixing flame retardants during melting and mixing of the polymer with additives prior to extrusion or coating. In this case, the resistance to atmospheric agents is much greater;

Some fibers, particularly polyester, can be produced by introducing phosphorus atoms or phosphorus-containing molecules into the polymer, which give FR properties. Fabrics derived from such fibers retain their properties throughout the life of the fabric.
To increase flame resistance, i.e. to prevent the very rapid processes by which intense heat favors the rapid combination of the canvas material with atmospheric oxygen (combustion), causing dangerous fires, there are several strategies and therefore additives of which we mention only the main ones:

1. Inorganic substances such as silica, alumina, ceramic nanoparticles or metal oxides, create a heat shield on the surface that prevents the inside of the fabric from reaching temperatures that could cause combustion.

2. Halogenated substances, which contain numerous atoms of chlorine and especially bromine (also called halogens) at high temperature, release these same atoms by decomposition, which immediately react with oxygen, suffocating the flame.

3. Phosphorus-based extinguishing agents, whose mechanism of action is based on the formation of phosphoric acid; this tends to promote carbonization reactions. The carbonaceous layer thus formed is reinforced and protected by the vitreous coating produced by phosphoric acid or its anhydrides, protecting the polymer.
Phosphorus retardants are currently gaining market as they are not subject to the ecological problems of halogen-based additives; In addition, they have a relatively low tendency to smoke.

Fluorocarbon resins

In technical textiles for outdoor applications, it is essential that the materials used are repellent to all those substances that could ruin, degrade and weaken the fiber of which they are composed. For these reasons, special chemical compounds are used that increase the repellency of textile materials to water and greasy substances. Specifically, fluorocarbon resins are currently used whose polymer chain is formed by six carbon atoms (therefore called C6) which do not contain those fluorinated compounds such as PFOA and PFOS considered dangerous for human health as endocrine inhibitors.
The target of these finishing treatments is to obtain a suitable water and oil repellency without modifying the "hand" of the textile product, ensuring a good solidity of the finishing for dry and wet cleaning.

Food contact

Materials and objects in contact with food" are defined as those materials and manufactured products intended for come into contact with food (kitchen and table utensils, vessels and containers, food processing machinery, packaging materials, etc.). By this term Materials and objects that are in contact with water are also indicated, with the exception of fixed public or private water supply installations.

As far as the Community framework is concerned, Regulation (EC) No 1935/2004 establishes the general requirements to be met by all the materials and objects in question. In particular, the regulation stipulates that all materials and articles must be produced in accordance with good manufacturing practice and, under normal or foreseeable conditions of use, must not transfer components to food in quantities that would in:

·Pose a danger to human health
· Lead to an unacceptable change in the composition of foodstuffs
· Lead to a deterioration of the organoleptic characteristics. Since it is not possible to test contact with all types of foodstuffs on the market, the Regulation provides for contact tests with specific food simulants with similar to specific categories of food. The most common are:
· Simulant A: distilled water (non-alcoholic beverages, honey, fruit, fish, meat, preserves, ice cream...)
· Simulant B: Acetic acid 3% in water (beverages, preserves, milk, cheese, coffee...)
· Simulant C: Ethanol 10% in water (alcoholic beverages, preserves...)
· Simulant D: rectified olive oil (bread, chocolate, butter, French fries, snacks...)
· Simulant E: Tenax (biscuits and baked goods)

Food grade

Fabrics made with plastics that can release plasticizers when in contact with food stuff..
These fabrics are subject to strict controls to prevent them from releasing toxic and harmful substances beyond the permitted limits.

The most important legislation is Directive No. 2002/72/EC (August 2002) and its updates, which are also referred to by national laws, indicating all the substances that can be released and the limit quantities, as well as the way to determine them.

In addition, as far as textiles are concerned, the plastics covering technical textiles that are in contact with foodstuffs must not contain fats of animal and vegetable origin, they must not change the taste, smell and appearance of the foodstuffs with which they may come into contact.

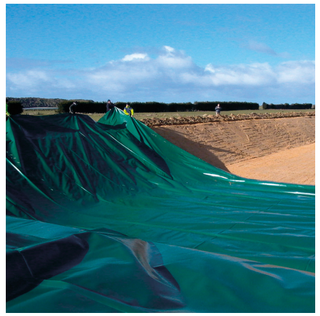
The duration of contact of foodstuffs must be determined both under normal environmental conditions and at higher temperatures.
Since it is not possible to simulate contact with all types of food substances, these contacts with some substances are simulated that summarize the main characteristics, taking into account the chemical composition and physical appearance. > All results must be available upon request to the Client.

Gas permeability

Gas permeability is an important parameter for evaluating the performance characteristics of fabrics in the technical field both with regard to fabrics that must be impermeable to gases (methane) such as, for example, membranes for biogas plants, and for fabrics where the passage of air is not only allowed but also desired such as blackout sail nets that allow ventilation, or printing nets for large advertising areas or filters.

Standards Reference
ISO 15105:2007 Determination of gas-transmission rate
DIN 53380 Gas permeability

Geotextiles



Geotextiles are defined as textiles that are used in the soil to drain, filter, separate, support the soil in various civil engineering applications. Their use, as an aid or alternative to traditional methods and products, improves performance and reduces intervention times in economically competitive terms.

A particular sector of application is that of products intended for agriculture, where the soil has its own specific function and where its interaction with the textile product must have a different approach; In this case, elements such as biodegradability and biological compatibility become decisive.

The use of geotextile products and their characteristics, especially with regard to large public works, is strongly regulated. The methods of conformity control for geotextiles and related products are those reported in the European Commission Decision 96/589/EC of 24 June 1996. Among all the conditions that govern the CE marking of these materials and the main characteristics regulated for the public sector are:

· Tensile and tear strength
· Puncture resistance
· Opening / Water permeability
· Durability (weather resistance)
· hazardous substances that may be released
(in compliance with current national or European legislation).

Glass transition temperature (Tg)

This is the temperature value below which an amorphous material behaves as a glassy solid. Amorphous polymers have a disordered chain structure and, below Tg, are hard and brittle. By applying heat they begin to soften until they become rubbery, and this is referred to as the glass transition.

Green marketing

Refers to the marketing of products that are believed to be ecologically preferable to others. The term refers to a wide range of activities, such as changing the product or production process, using eco-friendly packaging, as well as changing advertising. Other similar terms associated with this definition are "environmental marketing" and "ecological marketing". Green, environmental and ecological marketing are all part of a new vision of marketing, which not only adjusts and improves the existing one, but also tries to question it in order to propose a substantially different perspective.

More specifically, all three belong to the same group of strategies that try to address the problem of the lack of adaptation between marketing as it is currently conceived and the social and environmental realities that characterize the market.
Claims aimed at marketing the product may have legal implications, which require attention. Misleading or exaggerated claims by companies can have both regulatory and civil consequences. In the United States, for example, the Federal Trade Commission has established guidelines regarding these "green" claims.

The green marketing mix model contains the four "4Ps" or "Ps":

Product: A seller should offer eco-friendly products, which in addition to not contaminating the environment, must also protect it and limit existing environmental damage.

Price: The price of these products may be slightly higher than that of conventional alternatives. However, there are consumer groups, such as LOHAS, who are willing to pay extra for eco-friendly products.

Place: Logistical distribution is of paramount importance, as is the fact of focusing on using packaging made of recyclable materials. The marketing of local and seasonal products, such as fruit and vegetables from domestic suppliers, is easier to mark as "green" than in the case of imported products.

Promotion: Communication with the market should focus on the sustainable initiatives taken by the company, such as holding a CP or ISO 14000 certificate, or incurring large expenses in environmental protection, as advertising the latter can improve the company's image. In addition, eco-friendly products may require special promotional sales.

As for the additional social marketing "Ps" that are used in this process, they are:

Publics: Effective social marketing knows its audience, and it can attract more groups of people. "Public" are the external and internal groups involved in the program. External audiences include the target and secondary markets, and those who set the regulation, while internal groups are those who are in some way involved in approving or implementing the program.

Partnership: Many issues related to social change, such as "green" initiatives, are too difficult for one person or group to manage. Coalescing and associating groups and initiatives with each other strengthens the possibility of becoming more efficient.

Policy: Social marketing programs can go a long way in spurring change in individuals' behavior. However, unless the environment in which they are changed in the long run, it can be difficult. Often, a renewal of regulations is necessary and media support can be an effective complement to the social marketing program.

Pure Strings: how much can this effort cost from an economic point of view? Who can fund this effort?

The level of environmental support from the company – strategic, quasi-strategic or tactical dictates what activities should be undertaken. A strategic approach in one area may or may not have an influence on others. A company might make substantial changes in the production process, but choose not to enhance them in order to position itself as an environmental leader. In this way, although the sustainable initiative is not strategically integrated into all marketing activities, it is still included in the product-related area].

Green public procurement

The basic approach to which contracting authorities integrate environmental criteria at all stages of the procurement process, encouraging the dissemination of environmental technologies and the development of environmentally sound products, through the research and choice of results and solutions that have the least possible impact on the environment throughout the entire life cycle. It is an environmental policy instrument that aims to promote the development of a market for products and services with reduced environmental impact through the lever of public demand. Green public procurement is based on the minimum environmental criteria set by national authorities and within which environmental product certifications, with high reliability requirements, are recognized as a means of proof.

Greenguard

Environmental product certification originated in the United States. It is very important in particular for companies in the construction/furniture sectors, as it allows them to participate in particularly environmentally friendly tenders, such as those of Consip in Italy, and to acquire credits in international rating systems, such as: LEED-2009, LEED-v4, California-CHPS, Australian Green Star, ASHRAE189 and Green guide for health care 2.2.

Greenwashing

Refers to the communication strategy of certain companies, organizations or political institutions aimed at building a deceptively positive image of themselves in terms of environmental impact, with the aim of diverting the attention of public opinion from the negative effects on the environment due to their activities or products, which was established by the1970s.
What differentiates green marketing from greenwashing is the assumption on which the two communication strategies, or marketing, are based.

Companies that adopt a green marketing strategy declare themselves socially responsible for the life cycle of their products, which are generally presented as preferable to others on the market in terms of environmental impact and sustainability. Unlike companies that adopt the green marketing strategy, those that adopt the greenwashing strategy tend to amplify, if any, the efforts made to reduce the environmental impact of their products, proposing through advertising and communication an idea of sustainability that is not actually found in the company's production and mission.

GRS (Global Recycle Standard)

Certification that recognizes the importance of recycling for the growth of a sustainable production and consumption model, with the aim of promoting the reduction of the consumption of resources (virgin raw materials, water and energy) and increasing the quality of recycled products.

High Density Polyethylene - HDPE

High-density polyethylene is produced in such a way as to obtain a material with high crystallinity: the melting point is around 135 °C and the density varies between 0.95 and 0.98 Kg/dm3 This polyethylene is much stiffer than low-density polyethylene, has a much higher tensile strength and a much higher tensile modulus.

The properties of chemical inertness and low gas permeability, typical of low-density polyethylene, are also typical of high-density polyethylene and in some cases are better. It is therefore used in meshes and fabrics where specific characteristics and performance are required.

Hardness

The hardnesses of Shore A and Shore D plastic films are part of the set of property measurements surface mechanics. They are determined by means of manual pressurized devices called hardness testers on flexible plastics and elastomers. The strength of the specimen is established penetration of a truncated cone (Shore A) or a cone with a rounded tip (Shore D) after about 3 seconds or 15 seconds depending on the nature of the sample from the compression of the durometer on the surface.

Reference Standards
UNI EN ISO 868 Plastics and ebonite - Determination of hardness by penetration of a durometer (Shore hardness)

ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness

DIN 53505 Shore A and Shore D hardness testing of rubber

Heat shield

A coating that can filter (block) infrared sun radiation and disperse large amounts of heat, used to protect against overheating and to induce passive cooling.

Heddles

Rectangular metal structures that are part of the loom, which have meshes with vertically arranged eyelets, into which the warp threads are threaded according to the textile weave. In the loom they are present in the minimum number of two, and are used to alternate the warp threads to create the weave.

HSR (High Solar Reflectance) finishing

Finishing treatment that increases the reflectance of the sun's rays, ensuring an increase in the effectiveness of the fabric in sun (heat) protection and passive cooling. This treatment is offered on Opatex Cool.

IMO

The issue of safety in the naval sector is mainly dealt with by the SOLAS Convention, an acronym for Safety of Life at Sea.
It is an international (not exclusively European) Convention, issued by the IMO (International Maritime Organization), the United Nations agency responsible for the safety of navigation and the prevention of marine pollution by ships.

The Convention is structured in a series of Chapters and Rules that seek to deal comprehensively with the various aspects of safety in a particular environment: the ship.
The Chapter that deals in particular with fire safety is II-2 "Construction – Fire Protection, fire detection and fire extinction".
The above applies at the international level, while at the more strictly European level, without prejudice to the common provisions, the instrument for their implementation is the MED Directive (96/98/EC).

The MED Directive was originally published in December 1996 with the aim of harmonizing, for all Member States of the European Community, the conformity assessment procedures relating to equipment intended to be placed on board EU ships. It applies to passenger and cargo ships falling within the scope of International Conventions, such as SOLAS.
The MED Directive deals with the various categories of marine equipment in Annex A.1, which is subject to continuous revisions and updates for the inclusion of new products or the revision of regulatory instruments to verify their compliance.

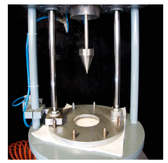
The equipment covered by the Directive, as can be seen from what has been said above, is covered by international standards whose scope of application goes beyond the European one. These are IMO or ISO standards, such as the FTP Code (Res. IMO MSC.61 (67)), which deals more closely with the fire protection aspect. This Code, entitled "International Code for Application of Fire Test Procedures", contains the test methods and acceptance criteria for materials and components constituting the structure of the ship and part of the furniture (bulkheads, decks, doors and fire windows, upholstered furniture and bed components, upholstery materials and curtains).

The fire protection products covered by the MED Directive, which must therefore bear the so-called "Rudder" marking, are reported in section 3 of Annex A.1 to the Directive itself, in which currently (Directive 2010/68/EU in force) there are 61 products, more than the others that are listed in Annex A.2 (containing the products for which the conformity verification standards do not yet exist or need to be updated).

The products covered by the MED Directive are tested in accordance with the standards indicated by the Directive itself: in the case of products that make up the structure or furniture, for example, reference is made to the aforementioned FTP Code (2010 FTP Code). The tests to be carried out on construction or furnishing components essentially concern their fire resistance/reaction properties (similarly to what is valid for terrestrial applications), in order to ascertain the ability of compartmentalization structures to effectively divide rooms and materials to participate in a limited way in any fire.

Low flammability properties are also tested for textiles, curtains, upholstered furniture and bed components.
To date, no particular correlation tables are known between these specific test methods necessary for the attestation of conformity (Mod. B) for fabrics used in the nautical sector and common standards (ISO, DIN, BS...); however, the types and instruments used are quite similar.

Static punching



Static punching

Impact test

They measure the energy required for the breaking of a sample subjected to a violent load (blow). The numerical values of the breakdown energy are determined by the change in kinetic energy of the weight used.

Standards Reference
EN ISO 12236:2006 Static puncture test (CBR test)
EN ISO 13433:2006 Dynamic perforation test (cone drop test)

ISO 9001

Defines the minimum requirements that an organization's Quality Management System must demonstrate to meet in order to guarantee the level of product and service quality that it claims to possess with itself and with the market. Today it is the best-known international standard, applicable to any organization, public or private, regardless of size, type and economic sector to which it belongs.
It represents an opportunity for the organization to build a Management System that takes into account all business processes to ensure the optimization of the use of its resources, to reduce production costs, to achieve the expected objectives and to maintain a constant quality level of its product/service in order to increase customer satisfaction. It promotes the adoption of a process-based approach in the development, implementation and improvement of the effectiveness of a quality management system, in order to increase customer satisfaction by complying with customer requirements.

ISO 14001

It is internationally recognized as the gold standard for environmental management systems (EMS Environmental Management System) and is applicable to organizations of all sizes and industries. The ISO 14001 standard provides a management framework for the integration of environmental management practices, pursuing environmental protection, pollution prevention, as well as the reduction of energy and resource consumption. ISO 14001 does not itself prescribe any specific environmental performance criteria, but it applies to environmental aspects that the organisation identifies as those that it can control and those on which it can exert influence.

ISO 45001

It is the first international standard to define minimum standards of good practice for the protection of workers worldwide. It establishes a framework to improve safety, reduce workplace risks and improve the health and well-being of workers, thus allowing any organization that chooses to certify its management system under accreditation to increase health and safety performance.

Developed by the International Organization for Standardization (ISO) with the contribution of experts from over 70 countries around the world, and implemented at national level by the Italian Standardization Body (UNI), it therefore provides an international framework that takes into account the interaction between the company and its business.

Created to ensure uniformity between the various ISO standards on management systems, UNI ISO 45001 adopts the High Level Structure (HLS – High Level Structure) and the main innovations.

Knotting

An operation that consists in tying the warp threads of the beam that is running out to the threads of the new beam, in order to link the productions and limit the technical stops of beam change.

Lacquering

Lacquering refers to the outermost protective layer with which a composite membrane is commonly treated. Through the lacquering process, the coated fabric is particularly resistant to weathering, UV rays, dirt and surface abrasion. The surface treatment is specific, in relation to the chemical nature of the coatings, in order to allow the welding and sealing of different sheets of fabric (in addition to printing where necessary), thanks to the chemical compatibility of the individual components.

The surface coating is generally made of the following polymer materials:
Acrylic: standard lacquer that can be glossy or matte, commonly used for truck covers, general covers, sun protection items.

Polyurethane: lacquer with high protection against chemicals and dirt in general, commonly used, for example, for pergola fabrics and for materials used for bulk bags for the storage of material for biogas plants.

Fluoropolymers (PVDF or PTFE): special lacquer for textile architectural fabrics that gives the membrane characteristics of high repellency towards any substance. This lacquering therefore involves great resistance to atmospheric agents (sun, rain, dirt) and thus increases the durability of the product. It is perfectly weldable with high-frequency and hot air technologies. Usually lacquering with fluoropolymers is a more or less loaded mix with acrylic resin; Hence the different types of top coats depending on the applications, workability and guarantees in terms of durability.

Latex printable

Digital printing is a generic term to identify a printing system where the shape to be printed is generated through electronic processes and imprinted directly on the support to be printed through the use of inks.

Latex Inks
Latex inks are pigmented, they are water-based inks that use an aqueous-dispersed polymer. There are no VOCs with latex-based inks, so there is no need for ventilation. The print comes out of the machine fully cured and can be laminated or finished immediately.
Latex technology uses radiant heaters and airflow built into the printer to evaporate the liquid in which the ink is dispersed; This allows the latex polymer particles to fuse, forming a polymer layer that adheres to the print media and encapsulates the pigment.
Latex inks are not as corrosive as solvent or eco-solvent inks, so overall maintenance requirements are lower. Latex inks apply well and there is no need to wait for the outgassing step before any lamination. This means that you have a higher production speed.

Latex Printing Process
A liquid film of ink is deposited from the nozzles of a Latex printing device in the print zone on the surface of the substrate. Then the radiant heat and forced air in the printing area evaporate the ink vehicle and cure the latex film. A continuous latex film containing the pigments is formed on the surface, which is finished, dry and ready for use or finishing.
Thanks to this new technology and the new Latex inks, it is finally possible to produce prints of higher quality and durability than the eco-solvent, with the utmost respect for the environment, without odors and vapors harmful to health.

LCA (Life Cycle Assessment)

The Life Cycle Assessment (LCA) is an analytical method that allows, to quantify the environmental impact of a product throughout its life cycle: from production to distribution, from use to disposal. It is a fundamental tool for companies that intend to pursue a sustainability strategy, as it allows you to identify the critical phases of the production process and the points at which to intervene to reduce the ecological footprint. Not only that: LCA also provides valuable information for external communication, helping to enhance the company's image on the market.

Low-Density Polyethylene - LDPE

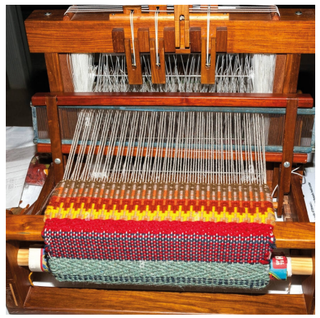
The first commercial polymer produced from ethylene is low-density polyethylene.
It is a partially crystalline solid that melts at around 115 °C and has a density (kg/dm3) of about 0.91-0.94. This results in poor mechanical resistance and that the products are easily deformed.
Polyethylene is essentially inert to all possible chemicals with which it can be attacked. It has very good resistance to acids.
The main fields of application of this polymer are those in which the material in the form of film is required, especially packaging: from food to agricultural products.

LeafClean®

Highly innovative finishing and ennobling treatment of sun protection fabrics that is based on a concept of "super" water repellency. The fabrics treated in this way are extremely resistant to water penetration and repellent to common dirt.
In addition, the deposit of any impurities on the surface can be easily removed: water droplets cannot adhere to the fibers of the fabric, dragging away dirt as well.
This important result is obtained by depositing on the fiber through successive treatments nanoparticles of the order of a micrometer (thousandth of a millimeter) together with substances Standard water repellents.
The treatment reproduces what happens in nature on lotus leaves which, with their surface microstructure containing infinite hydrophobic protuberances, were the inspiration for this research: hence the name LeafClean® itself.

Linen - LI

Linen is a cellulosic fiber derived from the stem of the Flax plant. Flax fibers are much more Strong and shinier than other textile fibers, they produce fresh and absorbent fabrics, but they wrinkle easily.
Fabrics with linen-like texture and freshness, but with a higher wrinkle resistance, can be made from artificial mixtures. In fact, many man-made fibers are now made in the laboratory trying to reproduce the wonderful characteristics of linen.
Antistatic, anti-stress, resistant to electrostatic radiation and UV rays. It is the fiber that more respectful of the environment: biodegradable, its cultivation preserves the soil and does not it needs chemical pesticides as it is not attacked by parasites and requires little water and It is anti-odor.
Due to its rigidity, it is used in pure only for woven fabrics. For knitted fabrics, given the difficulty in bending (forming bushings) It is normally used in blending with other fibers.

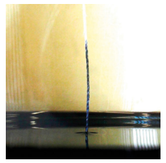


Loom

Textile machinery for the production of orthogonal fabrics, obtained by weaving two sets of perpendicular threads, called warp and weft. They can be of various types, and are categorized according to the levels of selection and the technology of weft insertion. They are used in the production of very simple fabrics (canvas, denim, ...), but also textured fabrics (jacquard looms), nets (Raschel looms) and chain knitwear.

Low-E and Emissivity

All materials radiate electromagnetic energy in relation to the physical properties of of the material and the temperature value at which it is located. In fact, while the absorption of radiation leads to an increase in thermal energy (i.e. temperature), The thermal agitation of atoms and molecules (temperature-dependent) is responsible for electromagnetic energy radiation. The particular "low-emissive" lacquers called Low-E are also designed to contain heat loss: in particular, they are made up of compounds containing metal oxides that help limit heat transmission from the outside coming from the thermal source par excellence which is the sun and heat loss from the inside out in the winter months from heating sources. At the same time, it is a optimal solution because it does not restrict the passage of light and therefore guarantees excellent levels of brightness.
Thanks to these special finishes, the internal temperature is easier to manage, for a greater comfort for the occupants of the premises.



Low Wick

Wicking
Rapid diffusion of a liquid, aqueous or oily, along the surface of a fiber, generally by capillary movement. It can lead to corrosion or decay of the fiber itself.
A polyester yarn used as a textile base for coated fabrics is defined as low Wick following a special treatment to avoid the absorption of water due to the phenomenon of capillarity.

In a normal polyester yarn, water (containing dirt and fungal spores) can be absorbed by capillarity, rise up on the yarn and remain nestled inside resulting in mold formation.
With a chemical impregnation treatment with perfluorinated substances, the yarns are made "low Wick", which means that they are less prone to excessive water absorption, resulting in a lower soilability index and greater resistance to microbial attack.

Matt

A particular finish that makes the final appearance of the fabric opaque; very common in digital printing because it lends itself better to enhancing the graphics when illuminated (they avoid the effect of light reflection). It is also defined by the French mat.

Mesh

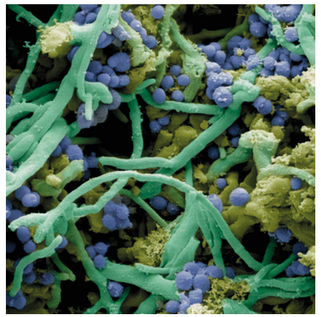
A type of material, also known as a grid, characterized by a high coefficient of opening which results in a greater passage of air and light (depending on the application required) compared to a standard or classic filtering fabric . The uses are among the most varied: as a shading cover, windbreak, room divider, animal shelters, fabric for indoor/outdoor furniture, seats, sun loungers, pool sides, stretch ceilings, transport.

Due to their strength and porosity, the grilles have been designed to achieve excellent aerodynamic protection.
The efficiency values for the wind data are criteria for evaluating the windbreak effect, i.e. the possible reduction of wind speed (while avoiding the "sail" effect). Wind effectiveness is the measure of the ratio between the speed of the air current before and after passing through the membrane.

Wind efficiency = E = 1- (VR / Vi)

VR = residual wind speed after crossing the gridVi = initial speed before passing through the grid

Porosity is the ratio of open surface area (micro-holes) to total surface area.



Mold grouth: causes and remedies

Technical fabric is often used to create structures that protect against climate change, such as tents, verandas, gazebos, screens, dehors and various structures.
Although it is an effective barrier against atmospheric events and an element of aesthetic decoration, the fabric is forced to suffer the consequences of the treatments it undergoes and the atmosphere that surrounds it in the long run: one of these is the formation of mold.

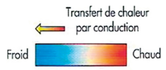
Growing Conditions →	Precursors →	Food for growth
Wet tarpaulin, >80% humidity in contact with the tarpaulin	Dust, contaminants, microorganisms, spores	Dirt, paint, fabric
Hot/cold surface contrast, weather events, non-drying	Proximity to woods, meadows or gardens, presence of planters or dry wood, outdoor area with wooden floor	Smoking cigarettes or stoves, cooking and eating food, failure to clean for a long time

What are they?

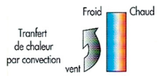
What we call molds are often filaments or agglomerates formed by the growth of microscopic fungi; There are many species that can grow together, generated by even more microscopic "spores" the size of a few thousandths of a millimeter. It is therefore easy to understand how they can be transported by air flows, on the fibers of clothes and by dust particles. Their main characteristic is that they break down nutrients outside the cell, by means of enzymes, that they cannot digest inside their cells.

The number of substances that they can affect is very large and it is not necessary that the surface on which they develop constitutes food for these forms of life; it is enough that over time, for example, dust, tar resulting from combustion, water vapor from breathing containing saliva particles, or some paints or plastics including PVC are used, that molds, in the presence of the right humidity, find a fertile ground to grow. Although below 65% relative humidity they die, the spores remain active ready to generate new fungi, carried by the air, when conditions allow.

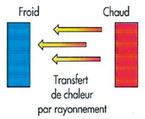
follow
Molds: causes and remedies



Heat conduction (internal/external)



Heat convection (wind/rain)



Radiation of the warm body (sun)

How they are formed

a) In critical humidity conditions, due to both atmospheric precipitation and washing, for example when a tent that is not perfectly dry is wrapped.

b) As a result of condensation.

c) From an accumulation of dirt: the air that surrounds us carries a dust consisting of micro-dust, dirt, combustion fumes, microorganisms, etc., which over time settle on the sheets. Lack of cleanliness or incorrect maintenance of the tarp allows these contaminants to accumulate in sufficient quantities to feed mold and microorganisms.

The combination of these three phenomena leads to the formation of mold over time with harmful effects on the appearance and structure of the sheet. Let's take as an example the interior of an outdoor area of a public place; the roof is covered by a PVC textile fabric and perhaps has closures on the sides. What happens to the fabric? Externally: the air is more subject to ventilation and mixing, the space is infinite, there is a direct radiation of the sun on the surface of the sheet, which will get dirty more easily but is less subject to stagnant conditions of humidity, the smooth and hanging surface of the sheet favors the flow of water. Through the cloth: heat exchange takes place in the three ways outlined below.

These phenomena are particularly important in the corners of the building, where the influence of the external climate is felt from several sides and the air recirculates little internally, if the tent is placed in a place with little sunlight during part of the day and a lot at other times. On the surface of the fabric, where the temperature can vary by tens of degrees, depending on the color and material of the tent, at the same outside temperature, if the sun's rays beat down or the sky is cloudy, sudden coolings can occur. In addition to wind, another factor that cools or heats the surface (heat exchange by convection) when it rains is water, a fluid with a much greater heat capacity than air, flowing continuously removes heat from the surface, rapidly lowering its temperature. Inside: if this structure were always closed there would be a development of water vapor due to the presence of many people; food and beverages generate water vapor, and steam carries droplets of oil and organics; Stoves, gas lamps, and cigarettes in a smoking room produce fumes that are absorbed. The presence of plants that need to be watered generates more moisture; Mold spores are present in the soil of the pots. Finally, a factor that can generate condensation is the presence of too much furniture, because it divides the space into many areas with different microclimates, with little air exchange and different percentages of humidity.

How to limit it
Lacquering
In very humid weather conditions and with embossed fabrics, a special lacquer is used to prevent water droplets and dirt particles from adhering to the surface of the fabric. Acrylic lacquers are used whose water- and oil-repellent properties are increased by the presence of fluorinated substances (such as PVDF or Teflon®). No substance dissolves or has an electrostatic attraction to them; This means that there is a lack of essential components for mould formation: moisture and dirt.

Treatment with biocides, anti-mould or fungicides.
These substances act at the cellular level on organisms, preventing reproduction or metabolism and causing their death. The use of these substances, even if present in very small percentages, is regulated by the European Community. The presence of these substances prevents mold from damaging the fabric by feeding on it, but it is not excluded that due to stagnation of water or humidity or dirt encrustations, molds still form over time. Constant care of the fabric by the user is necessary.

Practical tips to avoid dirt
Clean the fabric regularly every six months with the appropriate products. Avoid or minimize activities such as cooking, lighting barbecue fires, combustion stoves or using the tent as a smoking area: that is, avoid the formation of aerosols containing tar, ash or oils that settle on the surface of the sheet. Avoid the formation of dusty environments or the deposition of dust from outside. Avoid leaving possible sources of mold under the structure or immediately adjacent to it, such as wood, flower pots, dead foliage, etc.

follow
Molds: causes and remedies

To avoid condensation
If the structure is closed for a long time, ventilate the interior daily, especially after many people have stayed. When opening a previously closed structure, if it is warm outside and the inside cooler, ventilate for a long time until the temperatures are balanced: otherwise thermal bridges can be generated with the formation of condensation. If, on the other hand, there is a point of openness to the outside, for example the outdoor area of a public place in winter, this can act as a cold spot and in the vicinity condense the warm and moisture-rich air of the interior: control the formation of condensation.

Avoid closing the upper part of pergotende or rolling up side sheets that have water droplets on the surface, let them dry thoroughly first. If the towel is used to close a balcony or veranda, avoid hanging the laundry, if necessary ventilate thoroughly after the operation. If the external structure rests on a raised surface, check for stagnant water below the surface. Avoid placing barriers or furniture between the cold ends of a structure and the center of the structure that can thermally insulate them, cooling them even more. In cases for which it is impossible to follow the previous indications, provide for the use of dehumidifiers or fans.

Oeko-Tex®

The STANDARD 100 by OEKO-TEX® is an independent and internationally uniform control and certification system for raw materials, semi-finished and finished products in the textile sector at all levels of processing, as well as for the accessory materials used. Examples of articles certifiable: raw and dyed and finished yarns, fabrics and knitwear, accessories such as buttons, zippers, sewing threads or labels, packaged items of different types (clothing of all kinds, home and furnishing fabrics, bed linen, sponges, etc.).
Since 1992, the main purpose of STANDARD 100 by OEKO-TEX® has been the development of scientifically based test criteria, limit values and test methods. Based on the extensive and stringent list of requirements including several hundred individual regulated substances,

STANDARD 100 by OEKO-TEX® covers:
· Important legal regulations such as azo dyes, formaldehyde, pentachlorophenol, cadmium nickel, etc.
· Numerous chemicals that are hazardous to health, even if they are not yet regulated for law.
· The requirements of Annexes XVII and XIV of the European Chemicals Regulation REACH and the ECHA Candidate List of SVHC substances, whether these are relevant for textiles and clothing or accessories according to the assessment of the OEKO-TEX® Panel. As a result of discussions and developments considered relevant, the requirements of STANDARD 100 by OEKO-TEX® are as quickly and effectively as possible.
· Requisiti della normativa americana US Consumer Product Safety improvement Act (CPSIA) per lead.
· Numerous classes of substances that are also relevant to the environment

Thanks to its decades of experience, the STANDARD 100 by OEKO-TEX® helps to ensure high and effective product safety from the consumer's point of view. The criteria for and limit values are far more stringent than the parameters applicable at national level, and international. In-depth product audits and regular company audits also raise industry awareness of the responsible use of chemicals in the long term and on a global scale. This concept has played a dominant role for many years allo STANDARD 100 by OEKO-TEX®.

OEKO-TEX® toxic controls are primarily designed with the intended use of fabrics and materials in mind. The more intense the contact of a product with the skin
And the more sensitive it is, the stricter the human-ecological requirements to be met.

The product classes are divided as follows:
Product class I: Items for babies and toddlers up to three years of age (underwear, onesies, clothing, sheets, towels, etc.)
Product class II: Articles used in contact with the skin (underwear, underwear, underwear, underwear, underwear bed, t-shirt, socks, etc.)
Product class III: Products not in contact with the skin (jackets, coats, etc.)
Product class IV: Furnishing/decorative materials (curtains, tablecloths, upholstery for upholstered furniture, etc.)

Oleophobic

Resistance of a textile to contact with oily substances, calculated on the basis of a wetting test with a series of liquid hydrocarbons characterized by a different surface tension.

Test Conditions
The standard test condition is 20 ± 2°C, 65 ± 2% R.H.

Sample Preparation
20 cm × 20 cm specimens.

Test Procedure

Place the sample on a smooth, horizontal surface.

Starting with the lowest liquid number test (AATCC Oil Test Liquid Grade No. 1), carefully place small droplets (approximately 5 mm in diameter or 0.05 mL in volume) on the specimen in five different locations. The drops should be at least 4 cm apart.

The dropper tip should be held at a height of about 0.6 centimeters from the surface of the fabric. Observe the drops for 30 ± 2 seconds, from about a 45° angle. If no penetration or wetting of the tissue is observed at the liquid-tissue interface, the test liquid is changed. Continue this procedure until one of the test fluids shows obvious signs of absorption by the tissue.

Standards Reference
CNS 11308 L 3217-1985 Textile Oil Repellency Test MethodAATCC 118-2002 Oil Repellency: Hydrocarbon Resistance TestAATCC 135-2003 Dimensional Changes in Automatic Home Laundering of Woven and Knit FabricsISO 14419-1998 Textile-Oil Repellency-Hydrocarbon Resistance Test

Passive cooling

All those heat dispersion processes that take place without the adoption of mechanical tools or energy consumption. The HSR treatment on Opatex Cool is designed to induce this type of cooling.

PFAS

Is an acronym that indicates Per/Poly Fluoroalkyl Substances: it is a family of chemical compounds produced by man and not naturally present in the environment used mainly in the industrial field. PFAS are organic molecules containing fluorine and having a chemical structure that gives them very significant properties, which is why they are used to achieve excellent results in various industrial sectors, including automotive.
Among the main characteristics are Water and oil repellency, Chemical resistance, Wear and corrosion resistance, Thermal resistance.
The proposal from the EU Chemicals Agency (ECHA) which aims to reduce emissions of perfluoroalkyl substances (PFAS) was released on 7 February 2023. The restriction aims to target around 10,000 per- and polyfluoroalkyl substances that are very persistent in the environment.

P.I.M.

An acronym for Product Information Management. It is a system capable of grouping and organizing product information in a coherent way, managing its enrichment with different levels of access and serving it to the various distribution channels: site with product catalog, e-commerce, mobile applications, press, marketplace and much more.

Plasticizers

Chemicals that are added to polymeric materials to improve the flexibility of the polymer and to facilitate its machinability. They are molecules that bind stably to the polymer forming a homogeneous compound; They have been designed to space out polymer molecules, facilitating their movements and leading to greater flexibility (lower modulus) and ductility. Widely used to convert PVC from rigid to flexible variety.

The main role of the plasticizer is to improve the mechanical properties of polymers by increasing flexibility, decreasing tensile strength and lowering the second-order transition temperature.
Since plasticizers usually possess relatively long alkyl chains, they have the effect of shielding the polymer chains from each other, thus preventing them from reforming the chain-chain interactions that give rigidity to the unplasticized polymer.

Among the different qualities of plasticizers, the most common are phthalates, derivatives of phthalic anhydride. Phthalates account for 92% of all plasticizers.
Chemically, it is a phthalate ester derived from phthalic acid by a reaction of esterification.
Properties: colorless oily liquid (such as vegetable oil), ester odor, high boiling point, inert and stable even for long periods. Some of the phthalates are subject to restrictions (see REACH Reg.), consequently no longer used.

Polyamide (Nylon) - PA

Nylon is a synthetic fiber made in the USA by Dupont and was released on the market in 1938. It is divided into two main types depending on the polymer used: nylon 6,6 (obtained from from hexamethylenediamine adipate constructed from two monomers, each of which has a skeleton of six carbon atoms) and nylon 6 (obtained from caprolactam with a skeleton formed by six carbon atoms).

Polyamides are synthetic fibres obtained by spinning the resulting substances (polymers) from the reaction of an acid (p.es. adipic acid) on a chemical product derived from petroleum (p.es. hexamethylenediamine): the two monomers that compose it are combined by synthesis with each other and transformed into a macromolecule in the tablet state.
These pads, suitably treated and melted, are extruded through a die and solidified, and the burrs obtained are stretched to obtain filaments.

Nylon has several advantages, including wear and pull strength, light weight, and chemical resistance. It is crease-resistant and non-deformable, elastic and easy to maintain. On the other hand, it has no absorbent power and is relatively cold to the touch; It is sensitive to heat and with little resistance to snagging (pulled threads) for fabrics made of smooth continuous yarn (without twisting). The lightness of the fiber is a consequence of its low specific gravity.

Polyester - PES

It is obtained from polyethylene terephthalate (PET) macromolecules. It also exists in the "flame retardant FR" version and as a microfiber. It has high breaking strength, elasticity and resilience. The threads are produced in different sections or counts to achieve different aesthetic and functional effects.
In the synthesis phase, the molecules are associated with each other, through chemical polymerization reactions, giving rise to solid materials (grains or flakes called chips) to be easily transported and processed.

In the spinning phase, polymers are first made liquid, by melting or dissolving and, like artificial polymers, extruded through dies whose very small slits vary in shape (circular, triangular or three-lobed, stellar), size and number with the characteristics of the yarn to be produced. At the exit of the dies, the burrs are consolidated by cooling.

At this point, once the yarn has formed, this chemical fiber is treated with antistatic products and in Fine wrapped on bobbins and ironed.
By exploiting the thermoplastic characteristics of polyester, it is possible to create textured or slub crepe yarns, by shrinking the yarn through the furnace and then passing through the false twist spindle.

· Wear and tear resistance
· High elasticity
· It dries quickly and does not need ironing
· Chemical Resistance
· Resistance to mould and bacteria
· Low hygroscopicity

Polyethylene - PE

Polyethylene is a thermoplastic polymer belonging to the Polyolefin family. It is obtained from the polymerization of ethylene and is one of the most processed and used polymers, constituting the largest fraction of the world's polymer consumption. The technical characteristics are highly dependent on its molecular weight, crystallinity rate and molecular weight distribution. Polyethylene is used in different densities, low LDPE, medium MDPE and high HDPE.

Polyethylene can be used to produce yarns that can then be woven. Such textile materials consisting of regular flat structures formed by weaving through the weaving of a series of threads (warp and perpendicular to each other) that allow to obtain a fabric with excellent properties mechanical and regular openings, even of small dimensions.
These fabrics are UV stabilized and specially designed to meet the requirements of the Highest performance: non-toxic, very long-lasting, very high resistance to chemical agents and atmospheric, mould and the attack of insects and rodents.

Polymers

Their IUPAC definition is as follows: "A species characterized by a successive repetition of one or more species of atoms or groups of atoms (constitutive monomeric units) bound together in such quantities as to impart a whole series of properties that do not vary markedly by addition or removal of one or some monomeric units." The advantages are lightness, insulation capacity, chemical and environmental inertia, easy
processability.

Their characteristics are defined by the type of monomeric unit, the length and the architecture of the polymer. The most common polymers are: PVC, polystyrene, polymethyl methacrylate PMMA, polytetrafluoroethylene PTFE, Polyvinylidene Chloride PVDF, Polyurethane PU, Polyolefins (Polyethylene PE, Polypropylene PP), polyamides (nylon 6 PA6, nylon 6.6 PA 6.6), polyesters (polyethylene terephthalate PET), ...

Polymers can be classified in a number of ways, including thermoplastics (they respond to a increase in temperature with a decrease in viscosity and therefore with greater fluidity, which makes it possible to reform them a theoretically infinite number of times) and thermosets (a Once shaped, they retain their shape and their viscosity does not decrease as the temperature).

Polyurethane - PU

Polyurethane is a polymer obtained by polyaddition between a poly-isocyanate and a polyol; Depending on the different "qualities", a wide variety of additional components are added: blowing agents, catalysts, surfactants and other additives.
There are various types of polyurethane: flexible or rigid foam, rigid or elastic compact, film or resins for coating or lacquering. In addition, it is available in different densities, which allow a wide range of solutions for every need.

Some specific features are:
· Resistance to high temperatures, as opposed to PVC and polystyrene
· Resistance to atmospheric agents and impermeability: it does not swell and is not attacked by mold and bacteria
· Chemical and biological resistance
· Acoustic and thermal insulation
· Environmental sustainability
· Sanitary safety: does not contain or release hazardous components and is completely free of ozone-depleting substances.

In the textile world it is mainly used as a component of special lacquers or in the production of imitation leather for furniture, cushions and upholstery.

Polyurethane coating

As an alternative to PVC, the textile backing can be coated with polyurethane. The polyurethane coating is easy to weld and guarantees a good level of air tightness in the case of pneumatic structures, which is why it is one of the most used materials for inflatable structures. By using a polyester fabric backing, the tensile strengths required for structural applications can be achieved. It is used through transfer coating for the production of imitation leather in the clothing and furniture sector.

Polyvinil Chloride - PVC

PVC is one of the most widely used plastics in the world. It comes from two natural resources: salt (57%) and oil (43%). The electrolysis of salt water produces chlorine which, combined with ethylene obtained from petroleum, forms a vinyl chloride monomer (or CVM). CVM molecules are combined in a process called polymerization to form resin: a fine, white powder that, when mixed with additives, gives PVC its special qualities.

PVC compounds are obtained by mixing PVC resin with the various additives (stabilizers, plasticizers, lubricants, fillers and pigments) necessary to provide the product with the desired characteristics.

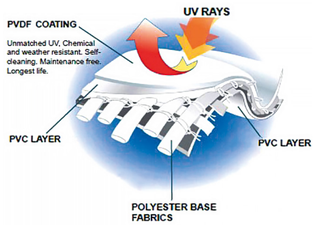
Today, all modern PVC production plants (both in Italy and abroad) use automated, closed-loop and integrated production systems. These systems allow the control and recovery of by-products and the reduction of polluting emissions deriving from the process. Closed-loop systems allow levels of safety, both for workers and for the populations living in the vicinity of the plants, considerably higher than those required by the relevant legislation.
Main processing techniques:

Calendering
The plastic material is first added with stabilizers, lubricants, dyes, etc., and then heat-treated in special machines, in which it is transformed into a homogeneous mass. It is then fed into the actual grille, consisting of a series of parallel cylinders (in a variable number between 4 and 5) and gradually closer to each other. At the exit of the calender, the semi-finished product passes to the winding machine, if in film, or to the cut, if in sheet.

Extrusion
The main body of the machine used in this process, called die or extruder, consists of a cylinder within which a worm screw rotates. The PVC mixture is fed into the hopper of the cylinder, where it is progressively heated until it melts, also due to the mechanical work of the screw itself which, by rotating it homogenizes and transports it, pushing it towards the exit hole. This, called die or matrix, is shaped according to the profile to be given to the product: it can therefore be with a flat section for the production of films or laminates, with a circular crown section for the production of tubes or tubular films, with a processed section for the production of profiles. At the end of the supply chain, the product is cooled so that it finally takes on the desired shape.

Blowing
The blow molding technique is always combined with extrusion (predominantly) or press-injection processes. In the extrusion-blow moulding combination, after introducing and closing a piece of plastic tube inside the mould, air is introduced in order to "inflate" it and do so adhere perfectly to the walls of the mold itself, which constitutes the negative imprint of the object. After a short pause for cooling, the mold is opened, the product extract and the cycle begins again.

Main applications:
· Fluidized bed or plastisol coating for immersion.
· Coating for coating.
· Main features depending on the formulations:
· Food Contact
· Weather stability
· Chemical Resistance
· Fuel Resistance
· Permeability to water vapour and ethylene
· Impermeability to gases and odours
· Adhesiveness
· Self-extinguishing
· Cold flexibility
· Heat resistance
· Lightness
· Combination of rigid and soft PVC
· Compatibility with other materials
· Damped elastic effect
· Unlimited dyeability
· Printability
· Workability
· Recyclability



Polyvinylidene Fluoride - PVDF

PVDF is a high-purity, semi-crystalline thermoplastic fluoropolymer. It shows a Good combination of properties such as:
· Outstanding chemical resistance
· High mechanical resistance
· Piezoelectric and pyroelectric properties
· Good machinability

It has many applications in electronics, particularly as a cable jacket material used in audio, video, and alarm systems, aircraft interior components, and office automation equipment.
Due to its excellent combination of properties, PVDF has become the largest volume of fluoropolymers after PTFE. Like the latter, it is used as a component in products for lacquering of technical fabrics in order to increase their outdoor resistance, especially in the sun protection and textile architecture.

Porosity – Opening coefficient

The porosity of a material is a scalar quantity and is generically defined as the ratio between the volume of voids (pores), Vp and the total volume Vm of the material considered.
Porosity is a fundamental characteristic of the so-called "grids" or "filter fabrics", characterized by a high coefficient of opening which results in a greater passage of air and natural light (depending on the application required) compared to a standard fabric. The uses are among the most varied: as a shading cover, windbreak, room divider, fabric for indoor/outdoor furniture, seats, sun loungers, pool sides, stretch ceilings. The efficiency values for the wind data are criteria for evaluating the windbreak effect, i.e. the possible reduction of wind speed (but avoiding the sail effect).
Wind effectiveness is the measure of the ratio between the speed of the air current before and after passing through the membrane.

Precontraint®
Technology

Précontraint®

Covered by a worldwide patent, Précontraint technology, owned by the French manufacturer of composite membranes Serge Ferrari, allows the production of flexible composite materials with superior dimensional properties that go far beyond classic industrial standards.
Précontraint technology consists of ensuring a coating of the fabric under biaxial tension (in the sense of the warp and weft) throughout the manufacturing cycle: the flexible structure in high tenacity PET microfilaments is coated with various layers of polymers, followed by a Dirt-resistant surface treatment.
In this way, materials using Précontraint technology acquire unique properties in terms of strength, dimensional stability and lightness, reducing deformation under load and offering a longer service life.

Proposition 65

This is a 1986 law that regulates the presence of chemicals in products marketed in California. The list of substances that may be carcinogenic or toxic to reproduction is updated annually by the Office of Environmental Health Hazard Assessment.

Protective paint

Generally a two-component coating system for flexible and rigid PVC surfaces based on aliphatic HDI isocyanate and aliphatic urethane-acrylic. These paints are very resistant to chalking caused by UV as the whole system is aliphatic.

They have the following characteristics:
· Scratch resistance
· Resistance to chalking
· Resistance to walking
· Suitable for flexible and rigid PVC substrates and other resins (epoxy and polyurethane)
· Resistant to most household cleaners (two coats are recommended for greater resistance to washing)
· Good resistance to wettability even if the surface is susceptible to continuous washing
· Abrasion resistance
· Cross-grid resistance (high adhesiveness)

Pureti

Is a range of solutions for the continuous purification of outdoor and indoor environments.
In the presence of light, it breaks down and removes dirt, odors, bacteria, and other pollutants, thus improving air quality and reducing maintenance costs.
Pureti, of American origin, is a treatment based on photocatalysis, composed of water and titanium dioxide nanoparticles. It is applied by micro-misting on all types of surfaces safely.
It is a highly adhesive and transparent solution, which differentiates it from other photocatalytic products, capable of purifying the air and removing pollutants from the environment on its own, with only exposure to light.

PVC coating

The coating of a technical fabric is obtained by coupling the basic fabric - a textile product in a semi-finished state - with products that improve its performance in terms of resistance to mechanical stress, fire and atmospheric agents, durability, maintainability and aesthetic qualities, including PVC. Coating takes place in distinct phases, sometimes carried out by a single machine.

The process starts with the positioning of the raw fabric in a beam that allows visual inspection to verify the presence of any defects and imperfections
An accumulator consisting of a series of rollers that can slide vertically up to 2 m in height is used to accumulate the fabric during the joints of the rolls without having to stop the machine.
The coating machine can never be stopped as the fabric in the ovens would be irreparably compromised. The first coating operation is carried out by putting the plastisol (PVC), with the addition of an isocyanic adhesive that increases its adhesion, in contact with the fabric. The most common type of coating is with doctor blade.

The mixture is deposited on the fabric and a knife (called doctor blade) placed transversely on the production line distributes the dough in a manner that regulates its thickness; The fabric is then "gelled" in a high-temperature oven and finally pressed between two cylinders.
Through coating, the fabrics are coated with special fluid mixtures of chemicals. The application may be different depending on the needs, the chemical product must be able to form a surface layer or penetrate the structure of the fabric, in order to guarantee the different characteristics of resistance and appearance required. To obtain an optimal result, the layer of chemical product applied must be as uniform as possible, both in terms of quantity and distension, the height of the treated fabric. The PVC used for coating on polyester fabric must be prepared by mixing special additives: plasticizers, stabilizers and any pigments are added, as well as substances capable of partially absorbing UV rays.

PVDF lacquer

Acrylic lacquer with the addition of a fluorinated polymer (PVDF polyvinylidene fluoride) that gives the membrane characteristics of high repellency towards any substance. This lacquer therefore gives great resistance to atmospheric agents (sun, rain, dirt) and thus increases the durability of the product.
It is perfectly weldable with high-frequency and hot air technologies. There is also a version in which the lacquer is loaded with a fluorinated polymer in a new conformation called crosslinked; That is, the various polymer chains are anchored to each other in a three-dimensional structure. This evolution of PVDF lacquer gives greater resistance to photo-oxidation and micro-breakage, a more stable and smooth surface to minimize dirt adhesion. It can be welded only after the "scraping" operation, i.e. the partial scraping of the coating.

Reach

Regulation (EC) No. 1907/2006 of the European Parliament and of the Council approved on 18 December 2006, called the "REACH" regulation (acronym for "Registration, Evaluation, Authorisation and restriction of CHemicals"), provides for the registration of all substances produced or imported into the European Union in quantities greater than one tonne per year.

The REACH Regulation has the following objectives:
· improve knowledge of the hazards and risks arising from chemicals so as to ensure a high level of protection of human health and the environment;
· promote the development of alternative methods to those requiring the use of vertebrate animals for the hazard assessment of substances;
· maintain and strengthen the competitiveness and innovative capacities of the EU chemical industry.

The REACH Regulation, consisting of 141 articles and 17 technical annexes, provides:
· The establishment of the European Chemicals Agency (ECHA), based in Helsinki. The Agency plays a role of technical and scientific coordination of the activities provided for in the Regulation and organises a database to collect and manage the data provided by industry http://echa.europa.eu/it/
· the registration of a substance, which consists in the submission by manufacturers or importers of certain basic information on its characteristics and, in the absence of available data, in the performance of experimental tests to characterise its physicochemical, toxicological and environmental properties;
· the assessment by ECHA and the Member States of the information submitted by companies in order to examine the quality of registration dossiers and to verify whether the risks of each substance to human health and the environment are adequately controlled;
· the authorisation, only for specific and controlled uses, of "very high concern" SVHC substances, such as Carcinogenic, Mutagenic and Toxic for Reproduction (CMR), Persistent, Bioaccumulative and Toxic (PBT) substances, Very Persistent and very Bioaccumulative (vPvB) substances and Endocrine Disruptors (IE);
· the adoption of general restrictions affecting all undertakings that produce, place on the market and use substances presenting specific hazards;
· activities to ensure the substitution of substances of very high concern with less hazardous substances or technologies;
· public access to information on the properties of chemicals;
· information and technical assistance to businesses (national helpdesks);
· control and supervision by Member States to ensure compliance with the requirements provided for in the Regulation;
In order to implement the requirements of the REACH Regulation, the Ministerial Decree of 22 November 2007 which indicated the public administrations involved:

Ministry of Tourism
Health (Competent Authority), Ministry of the Environment and Protection of Land and Sea, Ministry of Economic Development, which operate with the technical and scientific support of the Institute.
National Centre for Chemical Substances (ISS-CSC) and the Higher Institute for Environmental Protection and Research (ISPRA).
The decree provided, among other things, for the establishment of a Technical Coordination Committee.

Rebranding

Process by which a product or service developed and distributed under a name, a trademark, a brand or under the name of a company, is reintroduced into the market under another name or a different identity, without altering its composition and production process in any way.

Remade in Italy®

Remade in Italy® is the certification defined by the homonymous non-profit association, which allows an organization to declare the content of recycled material, expressed as a percentage, within a material, semi-finished or finished product, of any type and belonging to any supply chain.

The certification scheme requires the Company to prepare a management plan traceability of materials and flows within the production process, the continuous control of suppliers, the classification of incoming materials and maximum transparency towards the relevant documentation and any element that can demonstrate the correctness of the steps and the care in the process. The audit involves not only analysis of the relevant documentation but also a visit to the company, materials, products and the production process.

For these reasons, Remade in Italy® certified products express the utmost attention of the manufacturer in managing the raw material that derives from waste.
The Remade in Italy® certification is independent and accredited: there is no link between the body independent third party that carries out the verification in companies and the Association that owns the scheme to ensure the highest level of impartiality and objectivity.
For these reasons, the products certified in this way are recognized in the market of green products of the public administrations (Green Public Procurement).

The cornerstones of Remade in Italy® are:

· It is an "accredited" product certification: it means that the entire certification scheme is under the control of Accredia, the single accreditation body for certification bodies, therefore an institutional subject that controls the professionalism, competence and specific training of the bodies and auditors who carry out the checks.

· It is an independent certification: the rules for accreditation and the issuance of certifications they are contained in the Technical Regulations, recognized by Accredia, issued by the Remade in Italy Association, non-profit and legally recognized.

· It is an open certification: it does not operate, in fact, with a single certification body, but in the maximum transparency and openness to the market, the possibility is left to any prepared and qualified body to operate for the issuance of certifications, thus offering companies the freedom of choice with regard to the body on the basis of their own free considerations (greater competitiveness, relationships already started for other certifications, etc.).

These three premises represent the only way to give the declarations transmitted with the certification the highest degree of reliability, impartiality and transparency, necessary requirements for their validity pursuant to the new Procurement Code (Legislative Decree 50/2016, as amended by Legislative Decree 56/2017).

Resistance to repeated bending

The study of the dynamic flexural fatigue properties of coated textile substrates has long been widely used as a measure of product quality, especially in the footwear sector. This test, in which the specimen is attached to a plane unidirectional diaphragm bending fixture, is essential to understand the formation of cracks, tears, delaminations and general deterioration on the material once the pre-set bending cycles have been completed. There are different instrumentations and different conformations of the specimen depending on the material to be tested and the field of application and use.

Reference Standards
UNI EN ISO 7854 Textile substrates coated with rubber or plastics - Determination of the Resistance to damage due to repeated bending
DIN 53359 Flex cracking test

RoHS compliant

The RoHS Directive is the 2002/95/EC regulation adopted in February 2003 by the European Community. This legislation imposes restrictions on the use of certain hazardous substances in the construction of various types of electrical and electronic equipment.

Rubber

An elastomer is a material that can be stretched to at least twice its original length, even with low stresses, and once released it returns to its initial size. Based on this definition, polymers can be divided into rubbers (which are elastomeric materials) or plastics (which are more rigid materials).

The tires are characterized by absolute impermeability to gases and water and strong resistance to abrasion. In the technical textile field, they are used as gaskets and glues for adhesion between two different fabrics and especially for coating fabrics and canvases, as they are very resistant to mechanical wear, temperature variations and the attack of chemical substances such as oils.

The most commonly used rubbers for this purpose are hydrocarbon-based rubbers such as EPDM (ethylene, propylene), chloro-butadiene (neoprene), polyurethane and silicone rubbers; Silicone rubbers and neoprene have remarkable properties of thermal stability and flame resistance, which makes them preferred in special tasks such as tank covers for flammable oils or textile architectures that require high durability and protection. The advantage of resistance to high temperatures becomes a disadvantage during processing: they are difficult to weld with normal hot air and high frequency systems: sheets coated with these substances can only be glued and sewn.

Safety Data Sheet (SDS)

Often referred to by the acronym MSDS (Material Safety Data Sheet), it is a legal document that contains useful information for the protection of the health and safety of people and the environment associated with a chemical product.
This information includes the composition, the name of the manufacturer, the risks associated with transport, to people and the environment, disposal claims, hazard statements H and P recommendations, TLV/TWA exposure limits and protections (personal protective equipment) that must be worn by the worker, the consumer, or other persons who may accidentally come into contact with the chemical to which the MSDS refers.

Satin

A special finish that makes the final appearance of the fabric a glossy matt (satin).

Secondary raw material

It is the material deriving from a recovery process, which becomes an input or new "raw" material in a new production of the same or different from which it was generated. It differs from the by-product because it undergoes a recovery treatment in order to be reused.

Self-cleaning

Some synthetic fibers (such as polyester) that have not undergone chemical finishing, are not easily cleanable due to their particularly hydrophobic surfaces, with consequent accumulation of electrostatic charges, absorption and retention of dirt. By means of a chemical finishing based on fluorinated compounds or nanoparticles (Leaf Clean®), the surface irregularities of the fiber are saturated and the hydro and lipophobicity of the material is increased; so the dirt can no longer adhere to the irregularities of the fiber surfaces and therefore can slide off easily thanks to rainwater or at least be removed by normal cleaning means.

Sewable

Suitability of a textile to be made by stitching. Sewing means the joining of two or more portions of fabric by means of "stitches" obtained with needle and thread. Sewing is done thanks to sewing machines that work from the softest and lightest materials to more difficult materials such as leather and leather.
Thanks to the stitching, it is possible to obtain products of any size, even important ones, ribbons, zips, Velcro and other accessory components can be applied.

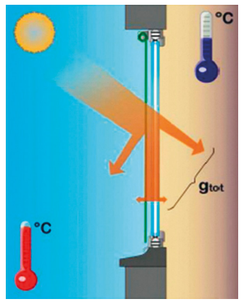
Shiny

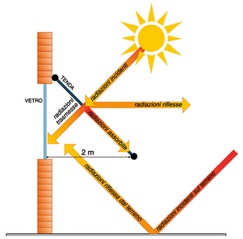
Particular finish that makes the final appearance of the fabric shiny; Very common in industrial tarpaulins for trucks, in textile architecture where it is preferred to have a bright or "glossy" effect.

Single-sided printing

In digital printing, fabrics are referred to as single-sided because they are illuminated on the front. This system is very useful for all those applications that need to be made visible after sunset. Usually the two sides of the fabric are different, by virtue of the fact that they are printed only on one side; For this reason, the printable side is very smooth and sometimes a primer is applied that allows greater adhesion of the inks, increasing the duration of the print. They can have a matte or glossy finish. The applications of single-sided fabrics are diverse, including banners, signs, billboards, and flags.

Solar Factor - FS or g





When we descend into the particular field of shields, it is crucial to know the total amount of energy that passes through them. It is defined as the solar factor g: it is defined as the ratio of the energy entering through a window, a surface, a curtain and the incident energy, with values ranging from 0 to 1. This ratio, since the energy is transmitted both by direct passage and by indirect passage (due to convection, induction, radiation), is influenced by the quantities seen above and by the characteristics of the material.

According to European legislation, the following are defined:

gV = solar factor of the glazing (or slat awning fabric)
gTOT = solar factor of the glazing plus the factor of the shading

In addition to the quantities already seen in the calculation of the solar factor, in the case of gTOT (see figure below), factors such as the distance of the screen from the window, the materials used, the laying conditions, the climatic surroundings of the structure come into play: an easy calculation is only possible through appropriate software.
A very important quantity is the sun protection index: IPS

IPS = 100X (1 - gtot)

It represents the percentage of solar radiation eliminated through the installation of the awning: as for the gtot, it depends on the type of glazing with which it was made.
An ideal tent with an IPS value of 100% provides total sun protection.

Standards Reference
EN 14501:2006 Blackout curtains and closures - Thermal and visual well-being.

Optical Parameters
Measurements of the responses in the visible range determine the Optical-Luminous parameters.

TL Light Transmission: measures the amount of solar radiation included in the visible that passes through a screen, which can be a window or a curtain or a window that is not completely opaque. Expressed as the ratio between the transmitted energy flux and the irradiated energy, it can have values between 0 and 1 or as a percentage between 0 and 100 transmission.

Similarly to thermal transfer, the following are calculated:

Light Reflection RL: the amount of incident light radiation that is reflected can have values between 0 and 1 or in percentage between 0 and 100 of reflection;

AL Light Absorption: the portion of light retained by a body through which light radiation passes through it in the visible field. Since it is not subject to remission, light absorption is less important than thermal absorption. Again, its value is expressed in %.

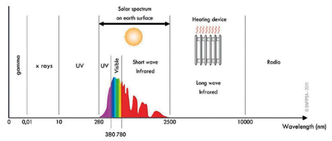
TUV Ultraviolet Transmission: the measurement of the transmission of a radiation is especially important in the case of radiation such as UV rays, which can have both harmful effects on health, and because they can induce fragility and/or discoloration in various materials: this TÜV parameter indicates the share of UV rays that are transmitted by a window, a sheet, a screen. Once these parameters have been obtained for the different products, the evaluations and classifications of solar shading are carried out according to current regulations.

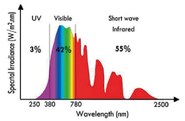
Ref. Standards
EN 14501:2006 Blackout curtains and closures - Thermal and visual well-being.

Spinning

A production process in which textile fibres are transformed into threads and yarns. There are different types of spinning, depending on the type of material to be processed. In the case of discontinuous fibers, spinning consists of parallelizing the fibers themselves as much as possible with carding operations and, in the longer and more valuable fibers, combing, and then twisting them. The twist is used to make the yarn tougher and keep the fibers together. Threads from continuous fibers, with the exception of silk, which is considered the only continuous natural fiber, are instead produced by extrusion of synthetic polymers.

They are composed of microscopic filaments called burrs, and do not need twisting to remain cohesive when kept continuous. It is possible, in fact, to have synthetic yarns produced using continuous fibers with different cuts (wool or cotton), such as those used for the production of acrylic or polyester fabrics for awnings.





Solar radiation (UV)

Ultraviolet radiation (UV radiation) is that portion of the electromagnetic spectrum of wavelengths between 100 and 400 nm (nanometers). Towards longer wavelengths, UV radiation borders on the shorter-wavelength visible light, which is perceived by humans as violet, hence the name "ultraviolet radiation".
UV radiation is divided into three bands of different wavelengths called UVA, UVB and UVC. The exact wavelengths at which the three bands are defined vary according to the specific fields of study. However, the most commonly used breakdown is as follows:

UVA	UVB	UVC
400-315 nm	315-280 nm	280-100 nm

The most important natural source of UV radiation is definitely the sun. Like all bodies at high temperatures, the sun emits a wide spectrum of electromagnetic waves ranging from infrared to ultraviolet. This emission is linked to the transformation of the thermal energy produced by the numerous nuclear and chemical reactions that take place inside and on the surface of the star, into radiant energy. The Earth's atmosphere, through absorption and diffusion processes, acts as a filter against the radiation coming from the sun.

Especially:

UVC radiation (the most harmful to life due to its high energy content) is completely absorbed by the ozone and oxygen of the upper layers of the atmosphere;

UVB radiation is also largely absorbed, but a non-negligible percentage (about 15-20%) manages to reach the earth's surface;

A large part (about 55-60%) of UVA radiation reaches the Earth's surface.

In summary, the UV radiation that reaches the Earth's surface is about 9% (about 120 Wm-2) of the solar radiation at the top of the atmosphere and is distributed between UVA (90%) and UVB (10%). They can therefore damage the tissue, promoting decomposition over time. The main function of our fabric in the comparison of UV rays must be shielding. The fraction of ultraviolet radiation that reaches the Earth's surface is influenced by various factors. Among these, the most important are:
· Cloud cover
· Ozone
· Altitude
· Latitude
· Surface Characteristics

Sound absorption

To better understand the properties of sound-absorbing materials, we will first distinguish the concept of sound absorption from that of sound impedance.
As the name suggests, a sound-absorbing material absorbs sound waves, preventing part of them from bouncing off the surface and reflecting off the surrounding environment. A soundproofing material, on the other hand, acts as a barrier for sound waves, preventing them from spreading outside.

So, depending on the materials used, we can get a:

Acoustic treatment: a set of devices, typically sound absorption and diffusion, aimed at obtaining precise and pleasant listening within an environment.

Sound insulation: solutions aimed at preventing sound waves generated within the environment from being transmitted outside it.

Specifically, a sound-absorbing device is used to prevent sound waves from "bouncing" excessively in the room, creating brief reverberations and echoes. We've all had the experience of an empty, unfurnished room, and perceive a decidedly pronounced echo with every noise.
Some typical sound-absorbing materials are: porous materials (melamine foams), rock and glass wool, felts, cork...

The fabric commonly used to give an aesthetic value to the sound-absorbing device (panel, wall cladding, false ceiling, ...), must be "sound-transparent", i.e. a medium/light fabric that opposes little resistance to the passage of air, built in such a way as to Allow the sound wave to filter through and trap it in the sound-absorbing material in combination.

Spray test

A spray test, also called spray test, is the determination of the resistance to surface wetting with water (wettability index) of fabrics subjected to a water-repellent treatment. This method does not provide information on the resistance to water penetration, but only on the ease with which the water droplet slides off along the surface of the fabric. This feature is considered essential to prevent dirt from adhering to the material, plus it defines the "self-cleaning" property of a particular item (since rainwater carries away any debris deposited on its surface) while also avoiding the formation of mold.
The wettability index is determined by comparing the appearance of the test tube with that of the descriptive and photographic samples provided by the reference standard.

Reference Standards
UNI EN ISO 24920 Fabrics - Determination of resistance to surface wetting (spray test)
AATCC 22 Water Repellency: Spray Test

Stain chart

A test that evaluates the behaviour of textiles in contact with contaminants. These substances can be more or less commonly used, and give a qualitative idea of the finishing applied to the fabric to be tested. Among the most used for this test we mention: coffee, chocolate, ink, wine, tomato, oil,...

Stain	Remedy
Asphalt	Treat carefully with a cloth soaked in 1,1,1-trichloroethane
Oil	Treat carefully with a cloth soaked in 1,1,1-trichloroethane. For minor stains, it may be sufficient to use solvent gasoline
Fat	Treat carefully with a cloth soaked in 1,1,1-trichloroethane. For minor stains, it may be sufficient to use solvent gasoline
Tar	Remove with turpentine (flammable!) and then treat carefully with a cloth soaked in 1,1,1-trichloroethane. For minor stains, it may be sufficient to use solvent gasoline
Ink	Remove with ethanol (rubbing alcohol), in case also treat with 1,1,1-trichloroethane
Adhesive	Remove with vinegar ester solution and xylol (1:1)
Oil paints	Remove with turpentine
Berries	Treat carefully with a cloth soaked in 1,1,1-trichloroethane
Bird droppings Ketchup or mustard Coffee or tea Coca Cola Grape juice Milk	1/4 cup of dish soap in 4 litres of water.
Beer Food coloring Urine Vomiting	1/4 cup dish soap and 1/3 cup white vinegar in 4 liters of water. /td>
Butter & Oil Grease Fresh/Dry Paint Salad dressing Shoe polish (Liquid) Sunscreen Tomato juice Tree Resin	Apply cornstarch as an absorbent, remove excess, clean up the residue with dish soap and water.
Dried blood	1/4 cup of dish soap and 1/2 cup of ammonia in 4liter of water.
Charcoal Pencil marks	1/4 cup of dish soap in 4 litres of water.
Chewing gum	Remove with turpentine
Chocolate	1/4 cup of dish soap and 1/2 cup of hydrogen peroxide in 4lt of water.
Pastel	Treat with isopropyl alcohol. Then clean with 1/4 cup of dish soap in 4lt of water.
Ink Nail polish	Treat with volatile solvent (100% acetone). Then clean with soap and water and rinse thoroughly.
Mildew	1/4 cup dish soap and 1 cup bleach in 4lt of water.
Shoe polish (wax)	Apply a hot iron protected by a towel. Apply cornstarch as an absorbent and wipe off the excess. Clean up the residue with soap and water.
Wax (candle)	Apply a hot iron protected by a towel. Treat with isopropyl alcohol. Then clean with 1/4 cup of dish soap in 4lt of water.
Wine	1/4 cup dish liquid, 1/3 cup white vinegar, and 1/2 cup isopropyl alcohol or hydrogen peroxide in 4 liters of water.

Stain repellency

Treatment carried out during the finishing phase of the fabric: it consists of applying a chemical coating, based on fluorinated compounds or other, capable of giving the material a low surface energy, thus decreasing its wettability.
The material, whether it is fiber, yarn or fabric, is therefore characterized by a certain degree of repellency, which in textiles translates into resistance to wetting by liquids in aqueous matrix and oily liquids. The final effect is that dirt, smog, dust, leaves remain only resting on the fabric, so washing or rainwater allow easy removal of the same; This prevents the deterioration of the material over time.

Standards for the reaction to fire of textile products (European classification – Euroclass)

The European standard UNI EN 13501-1 regulates the reaction to fire classification of construction products and elements (not to be confused with fire resistance). Even in the presence of a European classification, national approval is still required in Italy (see above), except for products for which there is a European product standard.

The European classification (EN 13501-1 Euroclass) distinguishes 3 product groups:
· Construction products excluding flooring
· Floors
· Linear Shaped Insulators
For construction products (excluding flooring) we will have:
· Class A1 (non-combustible products)
· Classes A2, B, C, D, E, F (combustible products) in relation to the increase in their participation in the fire.

The European classification in addition to the capital letters A, B, C, ...The participation of the material in the fire is completed by a parameter "S" relating to fumes and a parameter "d" relating to dripping. In particular, s1, s2, s3 are the three values that indicate the increase in the optical density of the fumes; while d0, d1, d2 are the three values that indicate an increasing danger of the dripping of fiery particles.

Classification examples are: A2-s1-d0, B-s1-d0, B-s2-d0, etc.

Test Methods
· Non-combustibility test (UNI EN ISO 1182) - Fornetto ISO
· Measurement of PCS or the higher calorific value (UNI EN ISO 1716) - Mahler's Bomb
· Flammability test for direct flame contact (UNI EN ISO 11925-2) - Small flame
· Test of exposure to a thermal attack by means of a Single Burning Item (UNI EN 13823) - SBI
· Test of the fire behaviour of floors with the use of a radiant heat source (UNI EN ISO 9239-1) - Radiant floor panel

1. UNI EN ISO 1182
Non-combustibility test to determine, under specified conditions, the non-combustibility performance of homogeneous products and the main components of non-homogeneous products.

2. UNI EN ISO 1716
Measurement of PCS, i.e. the amount of heat that becomes available as a result of combustion at constant pressure of the unit mass of the fuel, when the products of the
are brought back to the initial temperature of the fuel and oxidizer.

3. UNI EN ISO 11925-2
Flammability test of material in direct contact with flame

4.UNI EN 13823
Reaction to fire tests of construction products - Construction products excluding floors exposed to a thermal attack produced by a single burning object by means of a Single Burning Item - SBI

5. UNI EN ISO 9239-1
Evaluation of the fire behaviour of floors using a radiant heat source.

Standard for the reaction to fire of textile products (France)

French national legislation provides for several tests to determine the reaction to fire behavior of textile materials, identified in the reference standards NF P52-5XX.
NF P92-507 Classification of French test results with electric burner: classes range M1 to M4 where M1 is the highest rating.
The ranking is obtained by evaluating a set of tests, which I list below.

NF P92-503
A fabric sample is placed in a frame over a powerful heat source at a 30° angle. A flame is generated directly from the heat source on the surface of the fabric.
The following parameters are observed:
· how long the fabric continues to burn after the flame is removed
· presence of glowing droplets falling
· Measurement of the amplitude of the burned portion

NF P92-504
This test should be performed if the fabric contracts or tears during the NF P92-503 test.
A fabric sample is placed vertically in a loom. A flame is generated
It is placed in a horizontal position along the surface of the fabric.
The following parameters are observed:
· how long the fabric continues to burn after the flame is removed
· presence of glowing droplets falling

NF P92-505
This test should only be performed if glowing droplets fall during the test
NF P92-503 and NF P92-504.
A fabric sample is placed horizontally with a sieve with cotton wadding underneath. The flame burns the fabric, generating incandescent drops that fall on the wadding.
The following parameter is observed:
· Assess whether the drops light up the cotton swab

M1
· NF P92–503 after the flame lasts for up to 5 seconds
· NF P92–503 the width and length of the burn damage is a maximum of 250 mm
· NF P92–504 flame after is maximum 2 seconds
· NF P92–503, NF P92-504, NF P92–505 there are no burning drops

M2
· NF P92–504 flame after is maximum 5 seconds
· NF P92–503 the width and length of the burn damage are a maximum of 350 mm
· NF P92–503, NF P92–504, NF P92–505 there are no burning drops

M3
· NF P92–503 the width of the burn damage is max. 90 mm
· NF P92–503, NF P92–504, NF P92–505 there are no burning drops

M4
· If the fabric does not meet the criteria of M1, M2 or M3, it is automatically classified as M4 = non-flame retardant / resistant

Standard for the reaction to fire of textile products (Germany)

German national legislation provides for several tests to determine the reaction to fire behavior of textile materials, identified in the DIN 4102 reference standards, the most common of which is the one below.

DIN 4102-1 Fire Behavior of Building Materials and Elements Section 1:
Classification of building materials Prerequisites and tests.
Method B1: The term Brandschacht, literally "fire pit", refers to the test apparatus itself, which consists of a square-shaped vertical housing placed on top of a gas burner. The fabric sample is held vertically in a support frame and subjected to flame for ten minutes. At the same time, a steady, even flow of air is blown into the Brandschacht from below.
When evaluating the test, the temperature of the gas (smoke) emitted by combustion and the average remaining length of the sample (intact) are taken into account.

To be classified as B1, the tested fabric must show:
1. An average residual length of not less than 150 mm, without completely burning the sample
2. An average smoke gas temperature of less than 200°C

Standard for the reaction to fire of textile products (Italy)

The reaction of a material to fire is: "The degree of participation of a combustible material in the fire to which it is subjected (Ministerial Decree of 30 November 1983)".
Or, more recent definition: "The behaviour of a material that contributes with its decomposition to the fire to which it is subjected under certain conditions (UNI CEI EN ISO 13943:2004)".
In Italy, the reaction to fire of a material is conventionally expressed in Classes: the Fire Reaction Class is a prescriptive tool of passive protection in the field of fire prevention.
A Class is not always an intrinsic characteristic of a product, but often indicative according to the use and installation of the product itself. Reaction to fire tests are performed on materials, unlike fire resistance, where systems are tested.

Italian Classification
a) Class 1 / 2 / 3 / 4 / 5 (combustible products) according to UNI 9177
b) Class 0 (non-combustible products) according to DM 03/09/2001
c) Class 1IM / 2IM / 3IM (upholstered products) according to UNI 9175

a) Laboratory tests for the purposes of Classes 1 / 2 / 3 / 4 / 5:
Test of materials affected by the flame on both sides (UNI 8456)
Test of materials affected by the flame on a single face (UNI 8457)
Testing of materials subjected to the action of an ignition flame in the presence of radiant heat (UNI 9174)

(b) Laboratory tests for the purposes of Class 0:
Non-combustibility test (UNI ISO 1182)

c) Laboratory tests for the purposes of Class 1 / 2 / 3 IM:
Test of upholstered products subjected to the action of a small flame (UNI 9175)

UNI 8457
Combustible products liable to be struck by flame on one side only - Reaction to fire by application of a small flame.
UNI 9174
Reaction to fire of products subjected to the action of an ignition flame in the presence of radiant heat.
UNI 1182
Reaction to fire tests of products - Non-combustibility test
UNI 9175
Reaction to fire of upholstered articles subjected to the action of a small flame - Test method and classification.

Solvent printing

Digital printing is a generic term to identify a printing system where the shape to be printed is generated through electronic processes and imprinted directly on the support to be printed through the use of inks.

Solvent-based inks
Solvent ink is an organic solvent-based solution that contains the pigment and resin, and has the advantage of being resistant to discoloration, waterproof and abrasion resistant. The solvent evaporates, thanks to the heaters on the printer, leaving the pigment behind.

This ink typically resists discoloration for five to seven years, and is excellent for use with outdoor banners and vinyls. Since volatile organic compounds (VOCs) are present, an appropriate aeration and fume conveyance system is required. It doesn't take much heat for the carrier to evaporate, and because the solvent-based solution is corrosive, a print head with solvent ink is easily clogged. Regular cleaning is mandatory to keep the printer running.

Eco-Solvent Inks
The liquid eco-solvent ink solution comes from ethereal extracts taken from refined mineral oil. It is not an ecological ink, although it certainly has a lower environmental impact than the classic solvent. Eco-Solvent ink can print on many treated substrates and takes no longer to dry than solvent ink, making a printer service faster. It usually takes about two to three years for the ink to begin to fade, is waterproof and abrasion resistant.

Solvent / Eco-solvent printing process
Just like in solvent printers, eco-solvent ink printers use heat to evaporate the solution. Complete drying ends within the next 24 hours, so there is a waiting period before any finishing can begin. With alcohol and glass cleaner you can remove this ink; So, the durability is not as good as a real solvent ink.

Stereo microscope

A stereoscopic microscope, also known as a stereo microscope, microstereoscope, or dissection, is a type of optical microscope designed to produce a stereoscopic view of an object. This result is achieved through two separate optical paths in the microscope, differently aligned with each other, both ending in two objectives and two eyepieces. These two optical paths provide the right eye and left eye with differently angled images.

Tear resistance

Tear or tear resistance of a fabric is a particular physical-mechanical test performed on a textile specimen to measure the resistance to propagation of a fabric.
induced shear in the material. The test is carried out by constructing a specimen of the shape required by the standard used on which an incision has been made; Then, through the dynamometer, a tensile load. The device measures the force required to break the entire sample both in the warp sense than weft sense.

Reference Standards
UNI EN ISO 13937-1 Textiles - Tearing properties of fabrics - Determination of strength by means of the ballistic pendulum method (Elmendorf)

UNI EN ISO 13937-2 Textiles - Tearing properties of fabrics - Determination of strength Tearing of trouser tubes (Simple Tear Method)

UNI EN ISO 13937-3 Textiles - Tearing properties of fabrics - Determination of strength

Tearing of Wing Tubes (Simple Tear Method)

UNI EN ISO 13937-4 Textiles - Tearing properties of fabrics - Determination of strength

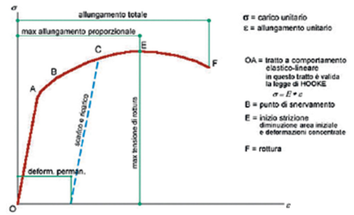
Tongue Tube Tear Test (Double Tear Test)

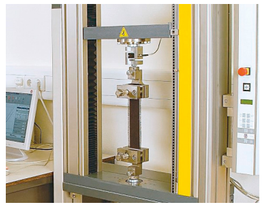
UNI EN 1875-3 Textile substrates coated with rubber or plastics - Determination of the Tear Strength - Trapezoidal Test Tube Method

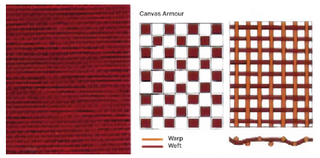
DIN 53363 Testing of plastic films - Tear test using trapezoidal test specimen with incision.

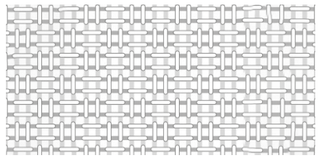
Tensile strength

The tensile test consists of subjecting a specimen to a deformation at a constant speed, through the action of a unidirectional tensile load F applied orthogonally to the section of the specimen. During the test, the load value and the length of the specimen are measured using a load cell and a strain gauge, respectively.
A fabric subjected to an increasing tensile force tends to stretch first in an elastic way, i.e. if the force is removed it returns to its original size (Young's modulus).









Textile armour

Method and technique with which the warp and weft threads of a fabric produced on a loom are intertwined. The weave is carried out in advance on squared graph paper: each square represents a cross between the weft threads (horizontal) and the warp threads (vertical). As a rule, solid squares indicate the passage of the warp yarn over the weft yarn.

The simplest model of weave is the canvas, widely used in technical fabrics where each thread of the weft passes alternately over and under each thread of the warp.

Derived from the canvas is the Panama or Natte structure where the warp and weft threads are paired or multiple.
Weaves can therefore be increasingly complex up to particular types of weaving, such as Jacquard.

Textile defects

The whole series of aesthetic and functional non-conformities concerning fabrics. Defects can be hidden or overt.
The former are vices that are not visible to the naked eye, such as poor colour fastness to light or washing, while the others are easily recognisable (e.g. holes, errors in weaving...)

Textile fibres

They are fibrous products that, due to their structure, height, strength and elasticity, lend themselves to being spun and then woven.
They are divided into three categories, such as natural fibers (animal and vegetable), artificial fibers (from modified or regenerated cellulose) and synthetic fibers or technofibers.

Among the vegetable fibers we remember cotton, made of almost pure cellulose: it has a white color or yellowish. The hairs can reach a length of 6 cm, are flexible, soft and very thin but hold up well to traction. Cotton is highly hygroscopic.

Among the animal fibers, the best known is wool, which has a remarkable resistance to wear and tear, little Tensile strength but good elasticity. It has a high insulating power and is highly hygroscopic.

Among the mineral fibers to be included is fiberglass (obtained from molten glass stretching), for its high breaking strength, toughness and dimensional stability. Very flexible and thin glass threads are obtained from glass fibres, which are used in the plastics reinforced industry, insulating tapes and fabrics, filters and heat protection fabrics.

Man-made fibers are products derived from the chemical processing of cellulose. Cupro, for example, derives from the treatment of the short cotton fibers that are located near the seed (linter); Since they do not lend themselves to spinning, they are dissolved in the cuprammoniacal solution, and then spun by extrusion. Other examples are viscose, modal, cellulose acetate, ...
Synthetic fibers derive from non-natural macromolecules that are chemically produced through synthesis reactions of compounds derived from petroleum, by polymerization and subsequent spinning of the polymer obtained.

Synthetic fibres originate from different polymers and, with their innovative characteristics, They represent the evolution compared to natural fibers.
The real advantage of man-made fibers is that they can be custom-programmed in depending on the specific applications for which they are intended.
We will therefore be able to have, depending on the of needs, bright or opaque fibres, elastic or rigid, very soft or coarse, delicate or ultra-resistant, coloured or transparent. Synthetic fibers are polyamide (nylon), polyester, acrylic, ...

Textile finishing

By "textile finishing" we mean the set of processes carried out on a raw textile base which, although part of the ennobling cycle, are applied to fabrics in order to improve their appearance, hand, chemical-physical properties, especially according to the possible fields of use.

Finishing operations can be carried out either through mechanical action (through the application of physical principles such as friction, temperature, pressure, tension and others), with the use of chemical substances (after application of natural and/or synthetic chemicals, which are more or less permanently bound to the fibers) or through a combination of the two above.

Mechanical means

Calendering
Polishing
Embossing
Lamination (Lamination)

Chemical treatments

Antibacterial
Stain retardant
Anti-mould
Sizing
Water- and oil-repellent
Fire retardant
Waterproofing

Mix

Coating
Resin coating
Dye
Press
Printing primer

Thermal conductivity

The ability of a material to give rise to a passage of heat under the action of a temperature difference. This R-value is given by the ratio between d, i.e. the thickness expressed in meters, and λ, the coefficient of thermal conductivity expressed in watts/kelvin.

Thermal resistance

the ability of a material to oppose or not to the flow of heat. The better a thermal insulator, the higher its thermal resistance value will be.

Thermoplastic Polyolefins – TPO

Polyolefin fibers are those fibers produced from polymers formed by the chain polymerization of olefins (alkenes) and that contain more than 85% ethylene, propylene, or other polymerized units of olefin. The fibers are not attacked by solvents at room temperature but are swelled by aromatic and chlorinated hydrocarbons only at elevated temperatures.

Polyolefins are glossy white translucent fibers with good draping qualities and a characteristic slightly waxy hand. They have excellent abrasion resistance and exhibit good wrinkle resistance. Polyolefins, especially polypropylene, have found a number of applications in particular in home furnishings and industrial textiles. Uses include indoor carpeting and outdoor, carpet support, upholstery fabrics, seat covers, chair straps, non-woven fabrics fabrics, laundry bags, knitwear and knitwear (in particular as a mixed fibre), socks mesh, ropes, filters and industrial fabrics.
All TPOs can be added with anti-UV to overcome weathering and external climate alteration tests.

Key features:
· Good mechanical properties
· Very good chemical resistance (chlorine resistance)
· Resistant to hydrolysis
· Eco-friendly
· Flexible even at low temperatures
· Odourless (no plasticiser migration)

Thermoplastic Polyurethane - TPU

TPU is a type of thermoplastic elastomer with improved characteristics. Hence, it is elastic and processable in the molten state. It has many favorable properties such as elasticity, transparency, oil resistance, and abrasion resistance. TPU is a form of block copolymer (contains soft and hard segments).
It can be colored through a number of processes and is also extremely flexible.
This is mainly due to the composition of hard and soft segments. The hard parts are both aromatic and aliphatic. They are generally aromatic, but the aliphatic hard segments are preferable when color retention and clarity in sunlight exposure is more important.

Threading

Procedure of preparation for weaving, which consists in separating the warp threads, according to the established textile weave, and threading them into the meshes of the respective heddles, in order to speed up the tooling operations of the loom.

Thickness

Thickness is defined as the distance between the front and back of a material measured perpendicular to the same place on a horizontal rigid surface. Instrumentation More common is the feeler gauge or digital caliper.

Reference Standards
UNI EN ISO 2286-3 Textile substrates coated with rubber or plastics - Determination of Characteristics of the piece - Part 3: Method for determining thickness

Titanium Dioxide – TiO2

Titanium dioxide (TiO2) is a chemical compound that comes in the form of a colorless, white-tinted crystalline powder.

Titanium dioxide, due to its high refractive index, is mainly used as a white pigment in paints, plastics and construction cement and as an opacifier for colored paints; For this reason, it is also commonly referred to as "titanium white".

Titanium dioxide-based pigments have greater hiding power, are non-toxic and do not blacken when exposed to hydrogen sulfide. It is also used as a filler in plastics and rubber, as an opacifier in paper and textile fibers, and in ceramic materials to increase their resistance to acids.

Titanium dioxide is also a well-known catalyst capable of degrading numerous organic compounds by oxidation. By exploiting this property, it is possible to obtain materials that are able to destroy the organic compounds deposited on them. This property could lead to the development of a new class of products with self-cleaning and depolluting properties.

Titanium dioxide in the anatase form is already in use as a degradant of toxic substances - pollutants in a center in Spain. When exposed to sunlight, TiO2 molecules catalyze the oxidation of organic residues (dirt, pollution deposits and microorganisms of various kinds) in water and carbon dioxide.

Total Solar Factor - gTOT

One of the most important aspects of thermal comfort in rooms is protection from the effects of of solar radiation.
Solar Factor g (solar transmittance) refers to the fraction of solar energy that penetrates an indoor environment compared to the solar energy incident on the window (in practice it is the solar factor of the glazing), while the Total Solar Factor, the gTOT, is the solar factor of the glazing in combination with the shading. Among the various factors that determine the energy efficiency of a solar shading, gTOT is the most important as it characterizes the overall overall performance, glass + shielding.

Calculating gTOT
After determining the transmission and reflection factors (light and solar) referring only to the sample in the absence of glazing (following the procedure described in the UNI EN 410 standard), the thermal comfort characteristics of the shielding are determined in combination with the stained glass window; i.e. the ability of the blackout closure to maintain, in an exposed environment directly to the sun's rays, a more comfortable temperature than the one you would it would have without the blackout closure (i.e. with only the window).

There are two methods to calculate the gTOT of a shield in association with a glass:

1) the UNI EN 13363-1 standard which provides a simplified method for evaluating the gTOT value, with a calculation that takes into account the U-value and g-value of the glass and the transmittance and the energy reflectance of the solar shading device;

2) the UNI EN 13363-2 standard, which provides a detailed calculation method that aims to represent the actual physical behavior of the association of a curtain and a glass when affected by solar radiation.

Based on the gTOT results, UNI EN 14501 identifies 5 performance classes for solar shading.

Transfer sublimation printing

Technically, transfer sublimation takes place when the ink printed on the paper, through a dedicated press, is transferred to the fabric and passes directly from the solid to the gaseous state, instantaneously. Sublimation is possible on polyester materials, woven or not, which, by loosening their molecular structure, allow the dye to combine with the material permanently and to be resistant to scratches, stress or color decay. The final result makes it possible to have a surface or fabric without any relief or thickness, washable and which preserves, in the case of printing on textiles, the texture of the material.

Translucent

A type of PVC coated fabric in which the textile support is constructed with enlarged meshes to facilitate the passage of light and the coating, even if colored, has a semi-transparent appearance. Normally, the transmission of visible light is in the range of 30% to 45%.

Transparency

The visual appearance of a transparent product is characterized in relation to the application of use for which it is intended. Packaging films used in the food industry are clear and transparent, while those used for plastic bags are translucent and diffuse light.

As a result, different materials will be used in production, with different methodologies processing.
The light-absorbing and light-scattering behavior of a clear product will determine the amount of light passing through it and the quality of object images observed through the film.

Total transmission is the ratio of transmitted light to incident light.
This value is closely linked to the absorption and reflection properties.
The total amount of transmitted light consists of a directly transmitted component and a diffuse component. Depending on the angular distribution of the diffused part, a transparent plastic material will appear differently. Visually, we can clearly distinguish two phenomena: wide-angle diffusion and narrow-angle diffusion.

Wide-angle scattering (haze): Light is scattered homogeneously in all directions causing a decrease in contrast. ASTM D 1003 defines glaze as the percentage of light that passes through the specimen and deflects more than 2.5° from the incident light beam.
See-through quality: Light is scattered at a very small angle, with high concentration.

This effect describes how well very fine details can be seen through the sample.
The quality of seeing through is measured at an angle with an amplitude of less than 2.5°.
Measurement and analysis of haze and see-through quality ensure consistent quality and help to analyze the influences of process parameters and material properties, such as cooling rate or raw material compatibility.

Objective transparency measurement: The figure on the right illustrates the measurement principle of the hazemeter. A beam of light strikes the sample and enters an integrating sphere. The inner walls of the sphere have a white and opaque coating, to ensure the homogeneous diffusion of light. A detector in the sphere measures total transmission and transmission haze. A ring sensor positioned on the exit hole measures diffusion at a narrow angle (clarity).

UV Curable printing

Digital printing is a generic term to identify a printing system where the shape to be printed is generated through electronic processes and imprinted directly on the support to be printed through the use of inks.

UV inks

The most common type of UV ink used in digital printing is a resin composed primarily of acrylate oligomers and monomers along with photo-initiators. When this compound is exposed to UV radiation, free radicals are released which cause the resin to polymerize and cure and harden to form a dry ink film. The pigment is then encapsulated within this film.
This type of UV radiation can be generated by an LED light source (low temperature, long life) or a mercury vapor lamp (high temperature, shorter life).
Due to the low viscosity of UV inks and the fact that they do not penetrate the substrate, they require less consumption than solvent, eco-solvent or latex. Although the ink itself can be expensive, the amount used is less. UV inks dry almost instantly and don't emit harmful VOCs.

UV-solvent inks

UV solvent inks use the advantages of UV and solvent technology. The ink droplet flattens on the material and does not rise up from the surface like traditional UV inks. Drying is done with less intense fluorescent lamps, which can limit the printing speed because the inks have to stay under the light for longer. However, the durability, abrasion resistance and extreme flexibility of this ink make them of superior quality.

UV Printing Process

The UV printing system is based on the fact that ultraviolet rays dry the ink completely and almost instantaneously, forming lattices and trapping pigments.

UV Protection factor

UPF indicates how many times the period of protection naturally offered by the skin from solar radiation can be multiplied before an erythema appears, i.e. an abnormal redness of the skin (sunburn) caused by congestion of the capillaries (such as inflammation). This probability is a function of the phototype to which the skin belongs.

Phototype	Features	Unprotected skin reaction to 30 minutes of sun in June	Natural Protection Time(min)
The	Fair skin, freckles, blonde or red hair, blue or green eyes	Always sunburn, never tan	5 - 10
II	Fair skin, blonde hair, blue or green eyes	Always sunburn, weak tan	10 -20
III	Fair skin, brown hair, brown eyes	Slight sunburn, good tan	20 - 30
IV	Dark skin, dark brown or black hair, brown eyes	Never sunburn, always tan	~ 45
IV	Dark skin, black hair, dark eyes	Never burn	~ 60
IV	Black skin, black hair, black eyes	Never burn	~ 90

follow
UV Protection Factor

For example, a fabric with a UPF value of 50 increases the natural protection time of phototype I from a maximum of 10 minutes to a maximum of 500 minutes, while for a phototype III the maximum protection time through the same fabric becomes 1500 minutes. In other words, we can say that a fabric with UPF 50 allows only 1/50 of the UV rays to pass through it, i.e. it blocks 98% (the 49/50) of the UV radiation.

UPF values can be measured according to the following international standards:

Australian/New Zealand Standard

AS/NZS 4399:1996
Sun protective clothing - Evaluation and classification
Italian/European Standard

UNI EN 13758-1:2007
Textiles - Protective properties against UV radiationPart 1: Test method for clothing fabrics

UNI EN 13758-2:2007
Textiles - Protective properties against UV radiationPart 2: Classification and marking of garments

American Standard

AATCC Test Method 183-2004
Trasmittance or Blocking of Erythemally Weighted Ultraviolet Radiation through Fabrics

There are numerous factors that influence the UV protection that is obtained with a fabric and consequently the UPF classification of the same. The most important are: Structure (the tighter it is, the more it protects), Color and tone (the darker the better), the areic mass (heavy fabrics are more protective), tension (the less taut it is, the more it protects) and wetting (better if dry). The addition of UV-absorbing substances or optical rinse aids can cause the UPF value to vary.

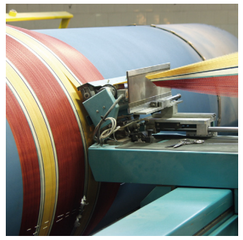
UPF determined	UPF Scale Assigned Values
2-4,9	2
5-9,9	5
10-14,9	10
15-19,9	15
20-29,9	20
30-39,9	30
40-59,9	40
60-79,9	60
≥ 80	80

UV Standard 801

This standard provides for the calculation of the UPF (Ultraviolet Protection Factor) by carrying out measurements both on the new fabric and on the fabric subjected to the main conditions of use, i.e. tension, wetting, abrasion, water washing, dry cleaning (if applicable).
The International Association for Applied Test UV Protection recommends the measurement of the UV protection factor according to the indications of UV Standard 801 for all textiles.
The final UPF value, declared to the consumer, is the worst of those obtained after the various stresses, thus providing the consumer with maximum reliability related to the fabric affected by the tests.

Warp

One of the two threads or yarns involved in the creation of an orthogonal fabric. The warp is the vertical thread that determines the length of the final fabric, and which, thanks to the movement of the heddles, creates the opening for the insertion of the weft.



Warping

Preliminary operation of weaving, which consists in the preparation of the warp on the beam by means of a machine called a warping machine. The warping can be sectional, in the case of warps with a high number of threads or complex warp notes, or fractional, in the presence of simple warp notes that do not involve a high repetitiveness of the ratio, or even when the number of threads is not particularly high.

Waste

Any substance which the holder discards or intends or is obliged to discard

Water column

Test for the analysis of the permeability of a fabric to water.
EN 20811:1992, ISO 811:1981 Resistance to water penetration at increasing pressure
The behaviour of the fabric, subjected to a gradually increasing hydrostatic pressure, is determined by detecting at which limit pressure value the water passage through the test tube begins. During the test, the water level must rise by 1 cm of water column per second. The tissue is observed until the third drop of water appears on its outer surface. The pressure value indicated on the graduated scale is then measured and this will be the waterproof value of the fabric. The analyses are carried out on specimens of 100 cm^2 surface, with pressure progressively varying from 0 to 200 cm of water column.

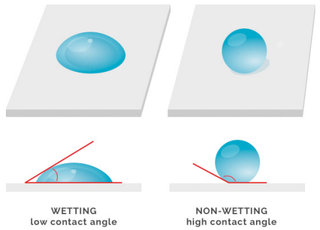
The pressure increase rate can be 10 cm/min (UNI and AATCC standards) or 60 cm/min (DIN and AFNOR standards).
EN 5123:1987 Water tightness test at constant hydrostatic pressure
The right side of the fabric is subjected to a constant hydrostatic pressure for a certain period of time and then the behaviour of the fabric to the effects of the passage of water is evaluated. A simplified, non-standardised version is the so-called Pocket Test.

Water footprint

The water footprint of an individual, community, or company is defined as the total volume of freshwater used to produce goods and services, measured in terms of volumes of water consumed (evaporated or incorporated into a product) and polluted per unit of time.

Waterproof

A fabric is defined as waterproof when, following finishing treatments such as resins or coatings, an airtight layer is created that is resistant to the passage of the drop of water. Depending on the nature and quantity of the finishing, the level of waterproofing of the fabric can be increased or decreased.
In the sun protection and roofing sector, it is usually considered waterproof to be the fabric that It resists water penetration when subjected to hydrostatic pressures greater than 800mm according to the standardized dynamic water column test.



Water-repellent

In general, water-repellent is the fabric that, after special treatments, resists the effect of wetting from water; The water droplets will not stay on the fabric, but will slide off. The resistance of a fabric to water will depend first of all on the nature of the surface of the fiber, the porosity of the fabric, the dynamic force and angle with which the water spray hits the fabric and of course the surface treatment of ennobling the fabric. Water-repellent fabrics have a certain degree of porosity so they are permeable to air and water vapour.

They will allow water to pass through when the hydrostatic pressure is high (e.g. during heavy rain). The mechanism of action is as follows: when a drop of liquid on a surface does not spread, the droplet takes on an almost spherical shape and has a contact angle (characteristic for the specific solid/liquid interaction). The contact angle serves as an indication of the wettability of the solid from the liquid.

So the solid, in our case the fabric, will be characterized by a certain surface free energy, while the liquid, in our case water, will be characterized by a specific surface tension value. In order for the fabric to be water-repellent, it is necessary to lower its surface free energy in order to decrease the wettability in relation to the liquid substance "water".
Finishing with "fluorocarbons" has become the most important water-repellent (and oil-repellent) treatment thanks to their ability to repel water and oily substances. The degree of water repellency of a fabric is measured with the Spray Test.

Weaving

The art of constructing a fabric by weaving threads or yarns through the use of a loom. Two sets of threads are used: the warp, which will determine the final length of the fabric, and the weft, which will define its width (called height, in textile jargon). The designated textile weave will determine the type of fabric that will be produced.

Weft

The second protagonist in the creation of orthogonal fabrics. The weft is the horizontal thread that defines the width (called height, in textile jargon) of a fabric; It is inserted into the opening created by the heddles through the use of different technologies, such as the shuttle, the bullet, the air jet or the pliers, depending on the type of frame.

Welding

Welding is the operation that allows an artifact consisting of a sheet covered with thermoplastic material or a film of the same material to take on the desired structure and dimensions.
A thermoplastic material heated above a certain temperature, called softening temperature, changes its physical state, transforming from a semi-solid material into a viscous liquid.

By heating two or more overlapping sheets or sheets, in the desired area, and exerting pressure, the liquefied plastic materials are mixed, which for subsequent cooling form a coating or a single film, at that point, if homogeneous materials have been used. In this way, the welded textile product that is obtained should maintain, almost, the same physical, elastic and resistance to external agents characteristics of the starting fabric.

In this regard, the EN 15619-2010 standard (Specification for coated textile supports intended for marquees and similar structures) for a welded fabric requires that the strength of the weld to the EN ISO 1421 test, tensile at break of plastic coated fabrics, must be at least 70% of the value of the same unwelded material.

The different types of welding are distinguished by the way in which this localized heating of the fabric is generated, followed by pressure, generally on a strip of fabric from 5mm to 60mm wide and from a few cm long up to 40 m long and three are generally the main ones:
· Hot air welding
· High Frequency Welding
· Hot bar welding

Other types of welding are hot wedge welding (similar to hot air), ultrasonic welding, and welding with the help of special liquid adhesives or in the form of tapes.

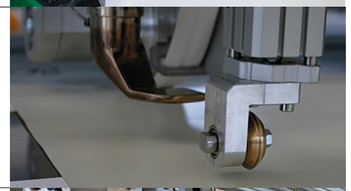
Hot air welding
It is based on a jet of hot air, with temperatures ranging from 300 to 700 °C, emitted by a nozzle of various shapes and widths, blown between two sheets that are crushed by a roller of suitable width.

follow
Welding

Hot air welding systems can be:

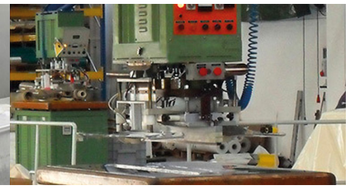
Portable hand-held apparatus consisting of an electric convector of air that is heated on a resistor before exiting the nozzle and a roller to crush the sheet, a system generally used for small welds

Welding units consisting of a steel guide, nozzle and roller, connected to more powerful heating units, mounted on benches for more precise work such as welding sun protection sheets or on trolleys for large-area work in the field, such as advertising banners or landfill bottoms



Complex welding machines, where several welding heads can move along guides of a few meters, in which air temperature, feed speed and roller pressure are electronically controlled.

High-frequency welding
In this process, welding is carried out by transmitting electrical energy in the form of radio frequency to two surfaces that must be welded: the molecules excited in this way vibrate, colliding with each other, with such a frequency that sufficient thermal energy is generated by rubbing to melt the material of the two surfaces, generally thermoplastic PVC, together.



follow
Welding

The advantage of this method is the uniformity of heating, all molecules heat up in the same way and not just those closest to the heat source
The electric current is transmitted through a metal electrode. In this way, a welded seal is formed with the same resistance characteristics of the material that surrounds it and the width of the electrode: The parameters that govern the welding are the power of the discharge that generates the radio frequency, its duration and subsequent cooling, and the pressure exerted. Also in this case, there are simpler machines that can be positioned on the bench or on the ceiling, to allow all the space around it to be used in complex processes and automated machines also in digitally controlled sliding for large jobs;
In the photos two of the most common types.

Hot bar welding
Hot bar welding is used when precise control of the melting temperature of the coating is required, in order not to burn the material, waves at the edges of the weld due to uncontrolled shrinkage due to too much temperature difference, and not to ruin printing effects, for example in the welding of advertising banners.

The instrument consists of a metal bar, with a flat lower part, of various lengths and generally from 20 to 60 mm wide, which is raised and lowered by means of a pneumatic system on a surface on which the sheets to be welded are superimposed.
The bar is heated by means of electrical impulses, according to the principle of metal resistance, for a few seconds up to the desired temperature. It is often made of copper, due to the excellent dielectric and temperature transmission properties of this metal, and provides both the temperature necessary for melting and the pressure necessary for welding. It can be hollowed inside to allow a coolant fluid to pass through and speed up the hardening of the weld.
It is a system that can also be used when a tape of adhesive is placed between the two surfaces, which improves welding.

Yarn and thread

The term yarn refers to a set of textile fibers that are held together through a twist, until a thread is formed. It can be differentiated into plain yarn, i.e. a linear textile made from staple or filament fibres, or from twisted yarn as a result of an operation of twisting several yarns together (strands).

There are different types of threads, which are obtained by joining different fibers or colors to form decorative effects, for example the bouclé, in which one of the two threads forms rings that protrude, the velure, in which pieces of thread are inserted to give a velvet effect, the buttoned, which has bows or dots, or the caged yarn, in which the thread is, as the name suggests, caged by a thin weave usually synthetic.

The yarn is sold in the form of a sewing bobbin, which is ideal for very thin yarns, skein, Ball of yarn or cone. The latter is the largest type and is typically used in industrial (the wire is wound on a cone made of plastic or cardboard).

Yarn count

The yarn count indicates the fineness of a textile material by relating weight to length; The various titles in use are grouped into two major systems.

Direct yarn count
Units of weight required to form a unit of length (constant length), i.e. as the fineness increases.

Direct yarn count T
(titer) = **C** (constant) x **P** (weight) / **L** (length)

This category includes:

· The tex title used in the international system
· The decitex (dtex) fineness used for continuous burr yarns and for chemical fibre staple yarn as well as the Denier (Td or den)
· The Scottish count is used for jute yarns.

System	Length units	Equivalent in meters	Weight units	Equivalent in grams	Formula
Tex	Kilometer	1.000	gram	1	TECH = 1.000 X P/L

System	Length units	Equivalent in meters	Weight units	Equivalent in grams	Formula
Decitex(dtex)	Myriameter	10.000	gram	1	DTECH = 10.000 X P/L
den(Td o den)	Matassina	450	den	0,05	TD = 9,000 X P/L
	Matassina	9.000	gram	1	
Scottish	Matassina	13.162	English pound	454	TS = 29,03 X P/L

Indirect yarn count
Units of length needed to form a unit of weight (constant weight) where as the number increases, the diameter of the yarn decreases.

Indirect yarn count T
(titer) = **C** (constant) x **L** (length) / **P** (weight)

This category includes:

· The metric number Nm used for woollen, carded or worsted yarns or the staple of synthetic fibres
The English cotton number Nec (or Ne) obviously used for cotton and discontinuous yarns
· Lino's English number (Nel)

System	Length units	Equivalent in meters	Weight units	Equivalent in grams	Formula
Metric (Nm)	meter	1	gram	1	NM = L/P
English Cotton (Nec)	Seashore (840 left)	768	English pound	454	NEC = 0.59 X L/W
Den (Td o dem)	Seashore (300 left)	274	English pound	454	NEL = 1.65 X W/W
English worsted wool (Nw)	Seashore (560 left)	512	English pound	454	NEW = 0.89 X W/D

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Young module

A measure that tries to explain the elastic behavior of a sheet, i.e. when it is tensioned, released, or when it has to withstand sudden loads such as snow or gusts of wind:
In a stress/strain diagram, when the load has a low value, the material elastically stretches, i.e. it can return to its original length if the load returns to zero.

The stress is proportional to the elongation, i.e. by placing these data on the graph we obtain a line whose slope (proportionality constant) is the modulus of elasticity or Young's modulus.
Leaving the field in which our module is reflected in the real data obtained, we first have a deformation and then a rupture of our tissue, undesirable behaviors.

Therefore, the calculation of the modulus and the evaluation of the elongation stress curve are fundamental operations in the design of external textile architectural structures and for example transport covers. The instrument used to determine the elongation stress curves is the dynamometer.

Therefore, in addition to elongation, the increase in strength produces a perennial deformation of the fabric until it breaks: since this is an undesirable situation, it is necessary to give a measure of the resistance of our fabric to breakage, which is one of its most important characteristics, especially for technical fabrics used outdoors, often in large tensile structures.
The tensile test consists of subjecting a specimen to a deformation at a constant speed, through the action of a unidirectional tensile load F applied orthogonally to the section of the specimen.

During the test, the value of the load and the length of the specimen are measured by means of a load cell and a strain gauge respectively, which together constitute the actual instrument called a dynamometer.
Such a test must be carried out in both directions of our fabric, warp and weft.
Numerous standards regulate the definition of this characteristic, all of which use the dynamometer as a test instrument, according to the material tested, for example the common strip method.

Standards Reference

EN ISO 1421:1998
Determination of tensile strength and elongation at break

EN ISO 13934-1:2013
Determination of maximum force and elongation at maximum force using the strip method.

The result is expressed as force (newton or its decimal multiple DaN) / width (50 mm or 5 cm).
A similar method to obtain the breaking strength, but not the elongation curve, different in the size of the sample width 100mm, not completely locked in the grippers and in the distance between the clamps 100 mm and therefore in the data expressed is the Grab method.

EN ISO 13934-2:2014
Determination of maximum force using the grab method.

The tensile and breaking behaviour, which follows the same principles, of thermoplastic films with a thickness < 1 mm, since they are plastics, follow other standards such as:

EN ISO 527-3:1995
Plastics - Determination of tensile properties - Part 3: Test conditions for films and sheets

ASTM D882-10
Standard Test Method for Tensile Properties of Thin Plastic Sheeting

Also in this case the difference lies in the size of the sample and the distance of the clamps: the result is expressed dimensionally as a pressure i.e. KgForce (KgF)/m² or in the American system in psi.

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