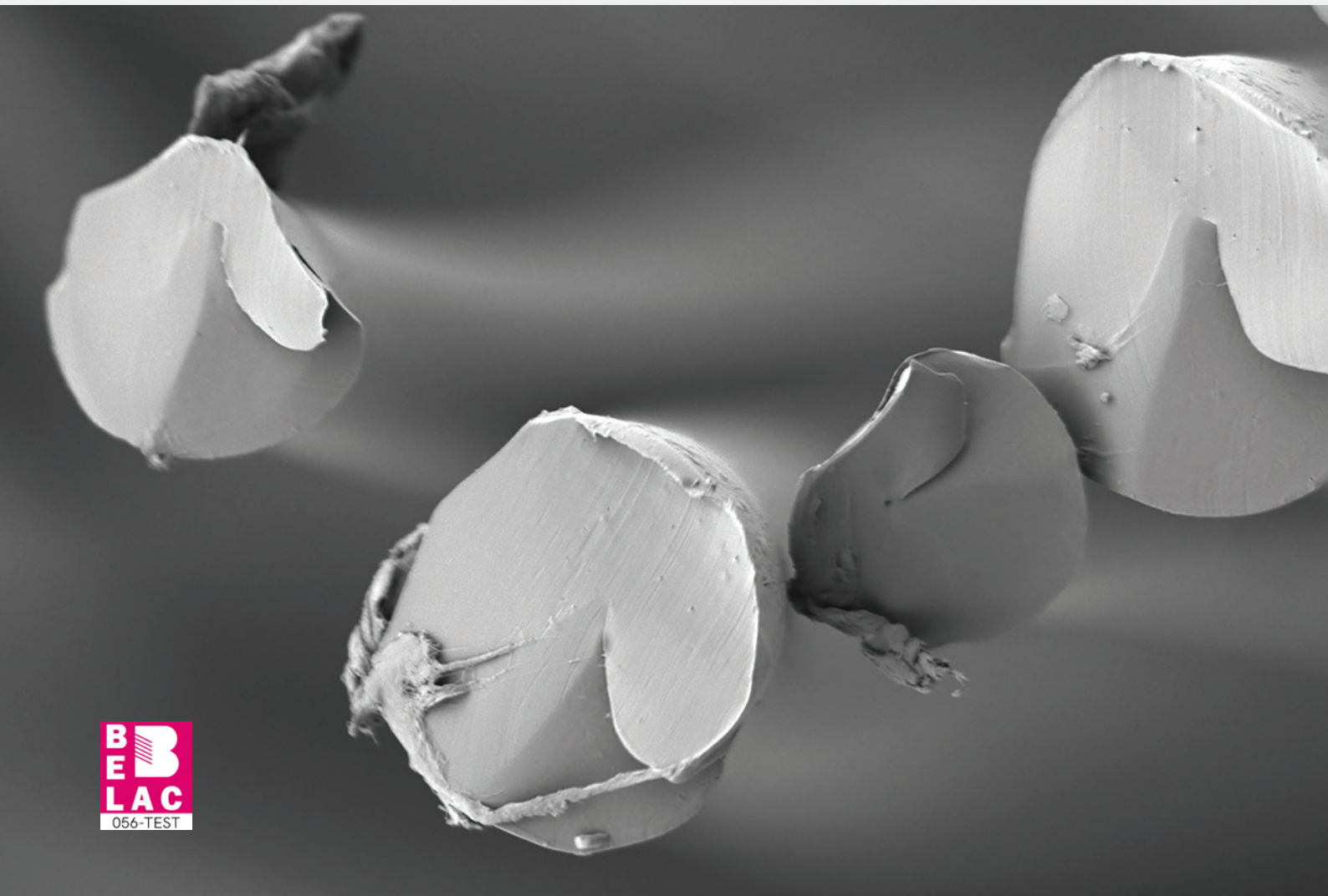
Testing

the key to perfection

CENTEXBEL

VKC



BELAC 056-TEST

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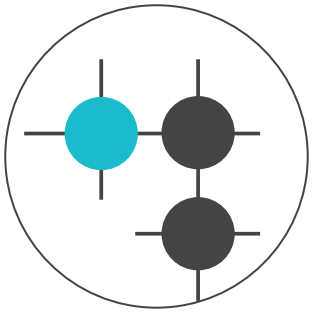


CONNECT

Testing of textiles and plastics - from raw material to finished product - by an independent and accredited laboratory not only results in an important competitive advantage but is also proof of one's respect of consumer safety and well-being.

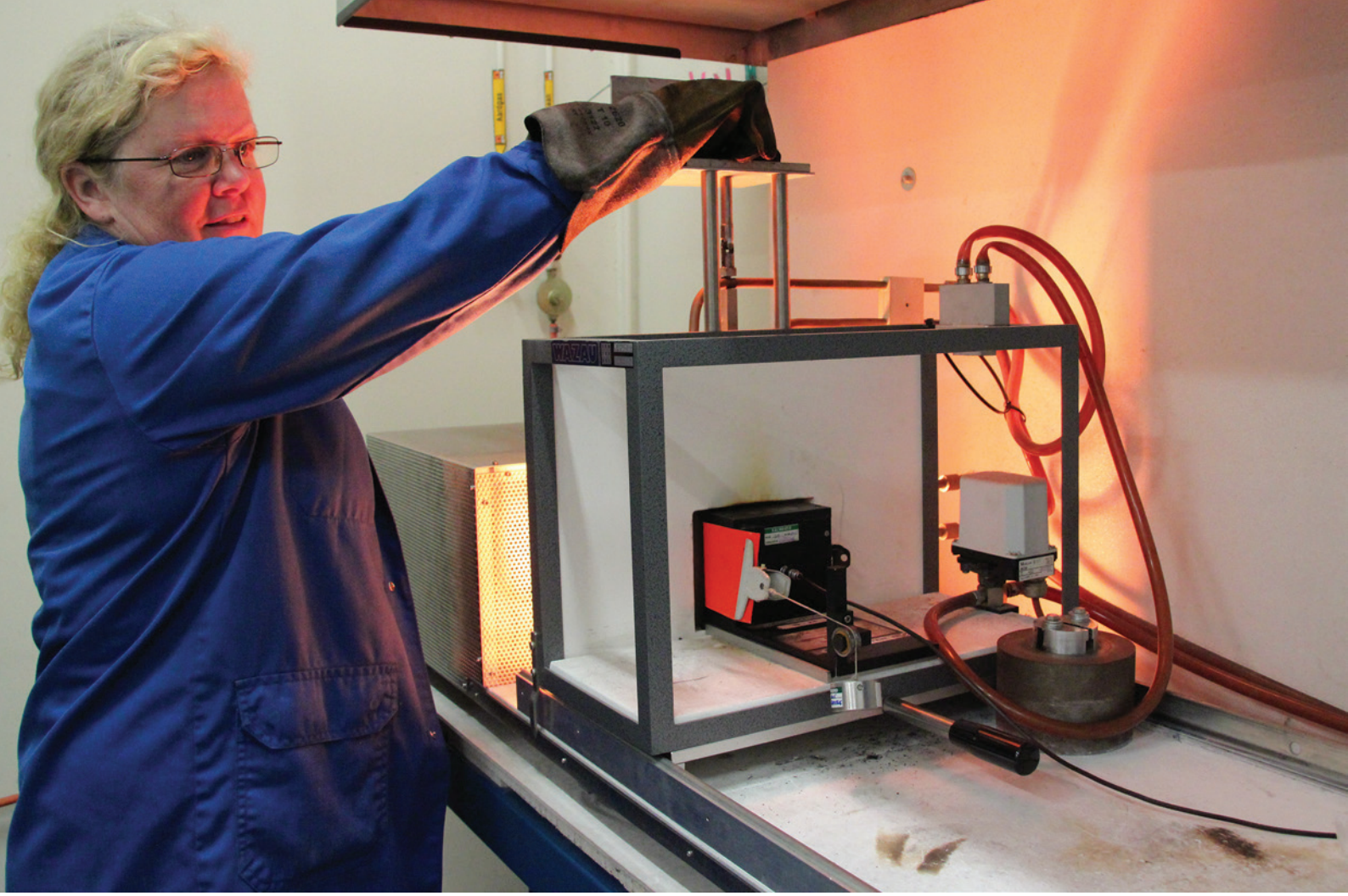
"Measure what is measurable, and make measurable what is not so."

Galileo Galilei

The BELAC NBN EN ISO/IEC 17025 accredited Centexbel laboratories are known for their:

- vast testing offer including several tests that are unique in Europe
- professional advice
- thorough knowledge and follow-up of international standardisation and legislation
- continuous updating and extension of testing equipment, testing methods
- chemical compounds database
- accredited tests involving annual audit of all laboratories
- conditions in conformity with the market

This brochure features a thematic selection of tests performed in our laboratories.
For more information about the Centexbel-VKC testing offer, visit our website:
https://www.centexbel.be/en/testing



Personal Protective Equipment (PPE) is defined as "any device to be worn or held by users for protection against one or more health and safety hazards". To meet legislation requirements, manufacturers must ensure that their products meet the relevant national, European and international standards or technical specifications.

As notified body #0493, Centexbel performs conformity assessments in the following application fields:

- equipment providing general body protection (clothing)
- equipment providing hand and arm protection
- protective clothing and gloves for use in potentially explosive atmospheres
- protective equipment against
  - biological agents
  - chemical agents
  - cold
  - electrical risks
  - heat, fire & flame
  - ionising radiation
  - mechanical risks
  - vibrations
- body armour
- high visibility clothing
- protection against knife cuts
- protective clothing for firemen
- protective equipment against handheld chain-saws

Some of the tests are presented and illustrated on the next pages.

Personal Protective Equipment (PPE)

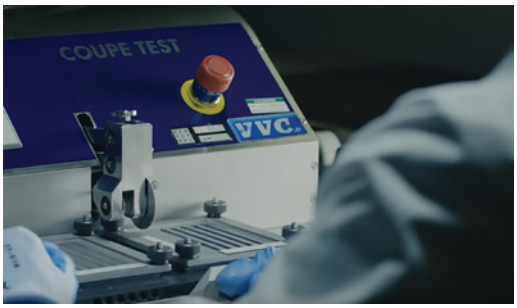
- dimensional stability to washing / dry cleaning
- tensile strength
- tear strength
- abrasion
- pilling
- seam slippage
- cut resistance
- impact resistance
- physiological comfort assessment
- IR camera thermal assessment
- colour fastness
- watertightness
- and many more tests

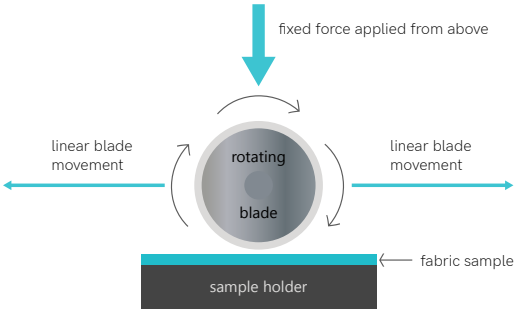
Protective gloves: cut resistance

EN 388 is used to regulate protection classes of cut restistant safety gloves. To achieve a high level of cut protection, several technical materials – known as high performance fibres – are used. Testing procedures and product classifications are adapted to reckon with this continuous process of product and material developments. The Centexbel laboratory is equipped with the required measuring technology to conduct tests in accordance with both the EN 388 "Coupe test" and the ISO 13997 "Cut resistance test".

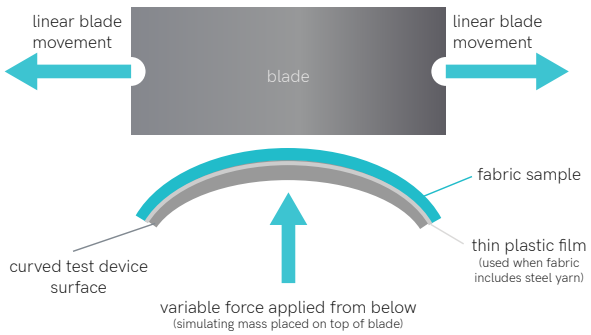
EN 388 Coupe test

- sampling area: palm of the glove
- linear movement of a rotating knife over the sample until the fabric is cut through
- introduction of reference material (typically cotton)
- altenration of sample and reference material until at least 5 results are registered
- loss of sharpness of te knife is compensated by cutting the reference material before and after the sample
- cut resistance is determined by the number of cycles needed to cut trhough the sample related to the reference material





EN 388: 2016 includes an additional cut resistant test according to ISO 13997 that is suited to evaluate new high performance fibres used in the production of protective gloves.



ISO 13997

- a fabric sample is fixed on a curved testing device and a force from beneath is applied
- the knife sharpness is calibrated after each completed cycle or when the knife has cut through the sample
- the cut-through is established when an electric contact is observed between the knife and the testing device
- if the sample contains any metallic yarns, a plastic film is placed between the testing device and the fabric to prevent electric contact initiated by the fabric
- the sample is submitted to a minimum of 20 cutting movements applied with variable forces
- the distance that is covered to cut through the material is measured
- the data are used to establish the force that is needed to cut through the fabric

Protective gloves: impact resistance

In a matter of seconds, a situation can escalate from a small bump on the hand to a life-altering injury. To meet the newest materials used in the manufacturing of protective gloves, the range of standard test methods has been updated (EN 388:2016) and extended to include the impact test as described in EN 13594, to enable workers to make an informed decision about the performance levels of the gloves they need.

More transparent information leads to safer work environments and fewer injuries

The impact protection on the back of the hand of protective gloves is tested according to EN 388:2016 that includes an impact resistance test in accordance with clause 6.9 of EN 13594.

Impact protection is one of the requirements of protective gloves according to EN 388:2016

To pass the test, the transmitted force shall be less than or equal to 7 kN (kilonewton) and no result shall be greater than 9 kN. When a glove has passed the test, it means that the protective material successfully and safely dissipates the forces away from back of the hand.

A 2,5 kg striker with a flat impactor face is raised to a height that will provide the required impact energy of 5 J (± 0,1 J) when touching the test piece.

Striker hits the test spot

After releasing the impactor, the peak force is recorded.

Permeation resistance to chemicals

There are many chemicals causing adverse effects on the (unprotected) skin ranging from contact dermatitis to permeation of the skin and systemic toxic effects.

ISO 374-1 Protective gloves against dangerous chemicals and micro-organisms - Part 1: Terminology and performance requirements for chemical risks - is the product standard comprising amongst others the testing standard EN ISO 16523 - Determination of material resistance to permeation by chemicals - part 1: Permeation by liquid chemical under conditions of continuous contact.

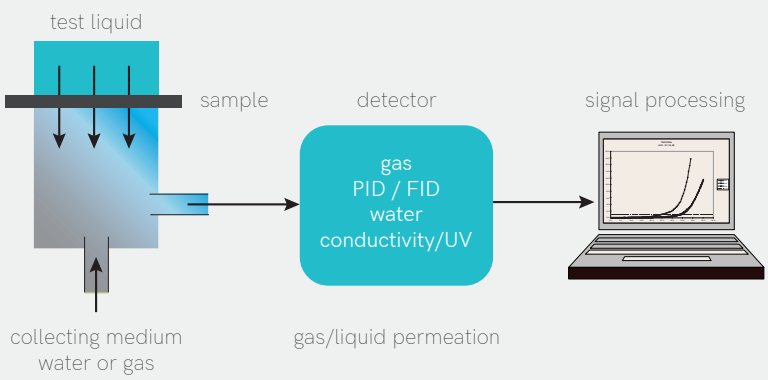
Permeation is a process by which a chemical moves through the material on a molecular level, involving

- the absorption of molecules of the chemical into the contacted (outside) surface of a material
- the diffusion of the absorbed molecules in the material
- the desorption of the molecules from the opposite (inside) surface of the material

The test specimen is mounted between the two halves of the permeation cell. The outer surface of the protective clothing, glove or footwear material is brought in contact with the challenge chemical. The permeation cell is placed in a temperature controlled room, cabinet or water bath at (23 ± 1) °C. The detection equipment is connected and the collecting medium is connected to the cell. The flow and/or stirring is adjusted to the required rate.

The concentration of the chemical in the collecting medium is measured periodically or continuously.

The NBT (normalised breakthrough time) has occurred when the permeation rates of the challenge chemical reaches the NPR (normalised permeation rate).

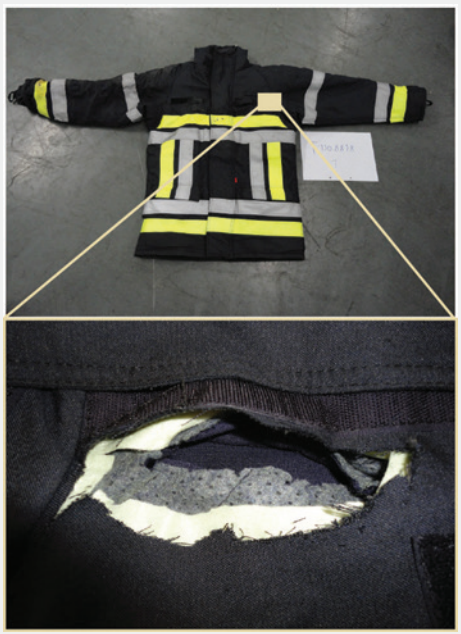


Firefighters suits

The minimum levels of performance requirements for protective clothing to be worn during firefighting operations and associated activities are specified in EN 469 - Protective clothing for firefighters - Performance requirements for protective clothing for firefighting.

The standard covers the general clothing design, the minimum performance levels of the materials and the test methods to determine these performance levels. It also covers covers the event of an accidental splash of chemical or flammable liquid but not the special clothing used in other high-risk situations e.g. reflective protective clothing.

As notified body # 0493 Centexbel is accredited to perform all tests covered by EN 469



The heat of a fire releases harmful chemicals, including benzene, toluene and polyaromatic hydrocarbons (PAH) that will adhere to the protective suits, gloves, masks and helmets, worn by firefigters.

Centexbel discovered that harmful substances penetrate the multilayer textile structure of firefighter suits and come into contact with the skin. With the aid of a thermal extraction, we mapped the semi-volatile substances in both used and new firefighter suits, which gave an indication of the presence of harmful components and of the temperatures needed to release them.

Firefighter suits are composed of several textiles layers, reflective strips and a permeable membrane and therefore complex and easily damaged when cleaned. Our research was concluded by conducting a comparative test of different cleaning methods, including washing, dry cleaning and liquid CO_2 cleaning, and their effect on the presence of chemical substances in the different layers. The LCO_2 method proved most effective.

Resistance to molten metal splash

EN ISO 9185 Protective clothing - Assessment of resistance of materials to molten metal splash

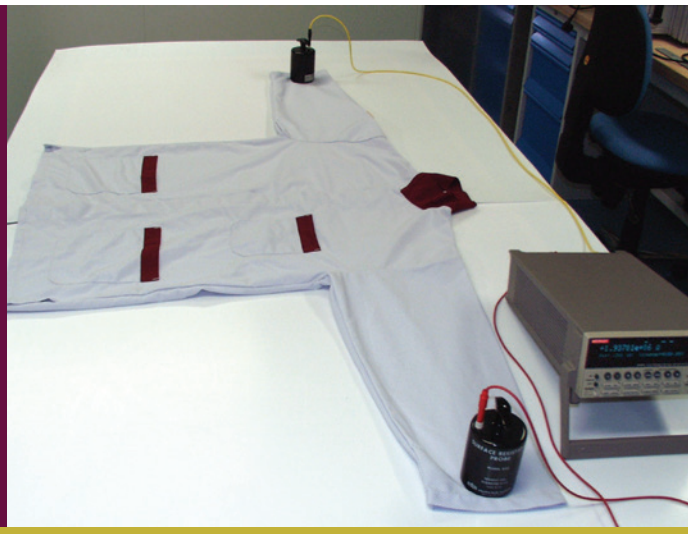
Materials are tested by pouring quantities of molten metal onto the test specimen supported at an angle to the horizontal on a pin frame. Damage is assessed by placing an embossed thermoplastic PVC sensor film directly behind, and in contact with, the test specimen and noting changes to the film after pouring. Any adherence of the metal to the test specimen surface is also noted. Depending on the result, the test is repeated, using a greater or smaller mass of metal, until the minimum quantity to cause damage to the film is observed.

The assessment uses an iterative procedure, and therefore the exact number of test specimens needed cannot be stated. Seven test specimens are usually sufficient to give a result. If there is previous experience of the material or if a material is being assessed for compliance with a specification, fewer test specimens will be needed.

Electrostatic safety

Electrostatic measurement

- surface resistance
- resistivity
- point-to-point resistance
- earth resistance
- discharge time
- discharge time by induction
- efficiency of electrostatic insulation



Climate room with atmospheric control

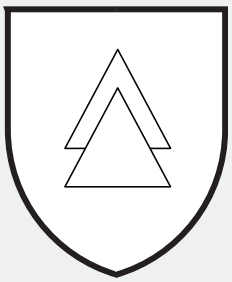
- temperatures between 19 and 26 °C
- relative humidity between 10 and 60 %

The room of 50m^3 is insulated against electric perturbations and is used to characterize the electrostatic behaviour of protective clothing, clean-room clothing, carpets, coatings, etc..

Electric arc flash

An arc flash is the result of energy that is released rapidly due to a fault between two electrodes. This energy release occurs during short circuit conditions. The flash quickly passes through the gap, or fault.

IEC 61482-2 is the overall standard covering protective clothing against thermal arc hazards of an electric arc. This standard also covers various aspects of the garment design. Garments complying with all of these requirements should be marked with the IEC 61482-2 symbol as well as the level of protection it meets.



IEC 61482-2:
Class x

IEC 61482-1-1 Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-1: Test methods – Method 1: Determination of the arc rating (ATPV or ^{E}BT50) of flame resistant materials for clothing. It determines the ATPV level (Arc Thermal Protection Value) of the garment. The basic principle is that the Garment ATPV must be higher than the Arc Flash energy level as calculated. The Arc Rating is expressed in cal/cm2

IEC 61482-1-2 Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-2: Test methods – Method 2: Determination of arc protection class of material and clothing by using a constrained and directed arc (box test).

Barrier properties against infective agents

People who are professionally involved in sewer maintenance, waste treatment, pet care, emergency clean-up or treatment of hospital risk waste are constantly exposed to the risk of infection by biological agents. Protective suits, gloves and masks against infectious agents are therefore lifesaving and have to comply with the requirements of EN 14126 - Protective clothing - Performance requirements and tests methods for protective clothing against infective agents.

EN 14126 determines the performance requirements and test methods for reusable protective clothing against infectious agents. This type of clothing must prevent infective agents from coming into contact with the (damaged) skin where they may proliferate. According to the test methods of EN 14126, Centexbel assesses the barrier properties of protective textiles against:

- the penetration of blood and bodily fluids (germs and viruses)
- the penetration of airborne micro-organisms (e.g. SARS, Ebola, smallpox, tuberculosis)

Performance requirements and standard test methods

FABRICS

- EN 14325 - burning behaviour, mechanical and chemical properties
- ISO 16603 & 16604, EN ISO 22610 & 22612 - performance requirements for protection against penetration of infectious agents

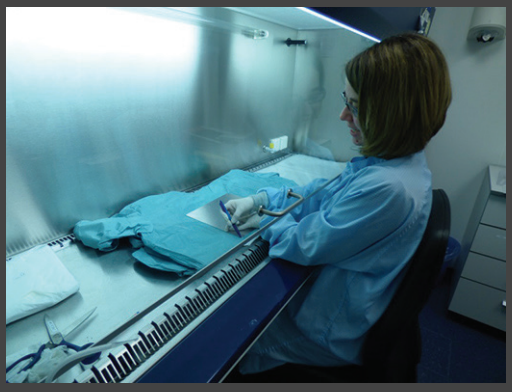
SEAMS, HEMS AND ASSEMBLIES

- EN 14325 - more in particular art. 5.5 seam strength

ENTIRE SUIT

- EN ISO 13688 - the fabrics and design may not cause irritation nor have any bad effect on the health. The suit must be as light and flexible as possible to ensure the wearer's comfort and freedom of movement, and yet offer an effective protection.

Products for Hygiene and Medical use



Microbiology lab L2 for cell cultures and toxicity measurements

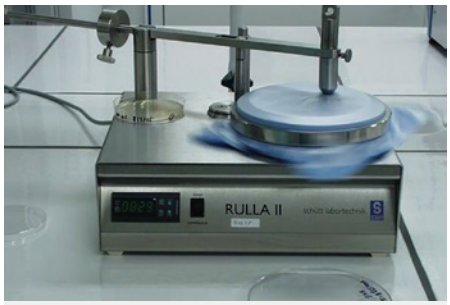
Centexbel's microbiology lab is designed for cell cultures and toxicity measurements and is also equiped with a cleanroom to assess the linting behaviour of cleanroom suits.

The work in the lab is organised according to the sequencing principle with a strict separation between the clean and contaminated zones:

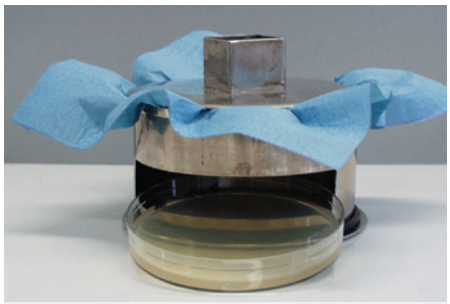
- The first zone is a clean compartment in which cell culture media and samples are being prepared and where sterilisation is performed in the autoclave.
- The second zone is composed of several compartments including a biohazard closet, incubators, shaking tables and other devices.
- The third zone includes the control room where contaminated petri-dishes are being inspected, as well as the decontamination and washing-up rooms.

Surgical drapes, gowns and clean air suits

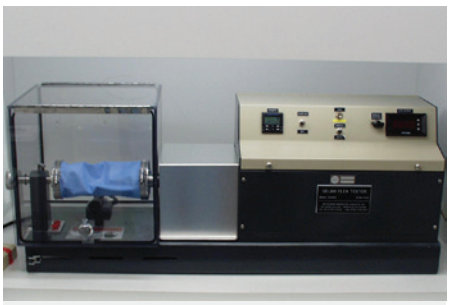
EN 13795 specifies the requirements for single-use and reusable coverings used as medical devices for patients, clinical staff and equipment and intended to prevent the transmission of infective agents between patients and clinical staff during invasive surgical procedures.



EN ISO 22610
resistance to
wet bacterial penetration



EN ISO 22612
resistance to
dry microbial penetration



EN ISO 9073-10
linting & cleanliness
particulate matter

Other tests in the scope of EN 13795:

- microbial cleanliness
- resistance to liquid penetration
- bursting strength
- tensile strength

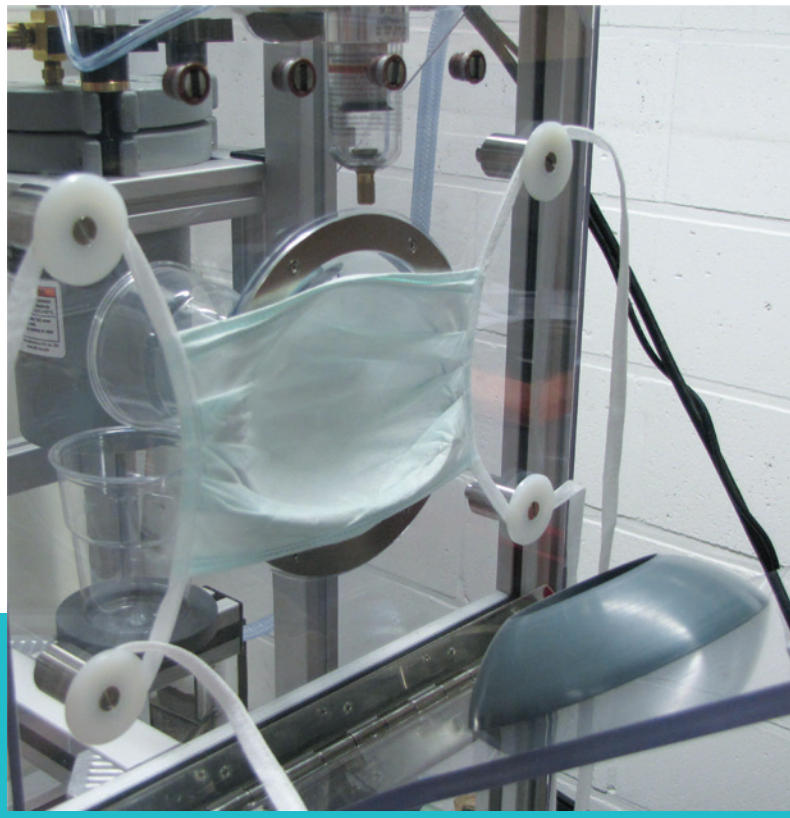
Surgical face masks

In Europe, surgical masks must wear a CE-mark and comply with the requirements defined in **EN 14683: Medical face masks - Requirements and test methods**. The standard defines surgical masks as medical devices, covering the mouth, nose and chin ensuring a barrier that limits the transition of an infective agent between the hospital staff and the patient.

In respect of the performances, the mask is tested as a final product and has to comply with different requirements.

The classification of the masks in 4 classes is based on the results from the following tests:

- bacterial filtration efficiency (BFE)
- breathability (delta P)
- splash resistance (synthetic blood)
- microbial cleanliness
- biocompatibility



Because surgical masks are considered medical devices of class I, the manufacturer has to run a risk analysis and additional tests if needed to respond to the European Medical Device Regulation 2017/745.

There are no requirements regarding barrier against inert particles.

The FDA (US Food and Drug Administration) is the organism that regulates medical devices on the USA market. Surgical masks are considered medical devices class 2.

The FDA has drafted standards to which manufacturers have to comply in order to receive a licence to sell the products on the market. The same standards apply to surgical masks, procedures, isolation, dental interventions and laser treatments.

The FDA strongly recommends that the manufacturer clearly indicates the use of the product on the package.

The masks are submitted to the same tests as the ones described in the European standard EN14683, except that the FDA also prescribes the measurement of filtration efficiency regaring inert particles (latex) and fire tests.

The US standard **ASTM F2100-11 Standard specification for performance of material used in medical face masks** describes the tests and requirements with which the materials have to comply that are used to produce the masks. Several tests are not run on the final product, but on the different materials have to be tested together in the way they will be used in the final mask.

The performances of the materials composing the mask are evaluated by five tests :

- bacterial fitlration efficiency
- breathability (delta P)
- splash resistance
- particle filtration efficiency
- fire test

According to the results, the masks are classified in three levels.

Laser beam resistance of surgical drapes and/or patient protective covers

A laser is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The term "laser" originated as an acronym for "light amplification by stimulated emission of radiation". Although frequenlty used in surgery, it is essential that the patient is protected with laser resistant surgical drapes.

ISO 11810-1:2005 Test method and classification for the laser resistance of surgical drapes and/or patient protective covers - Part 1: Primary ignition and penetration

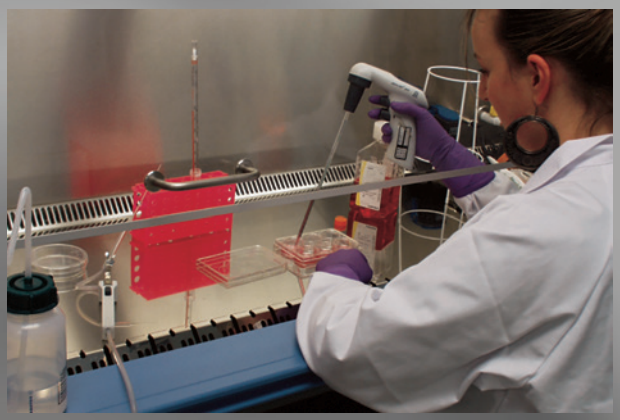
Principle:

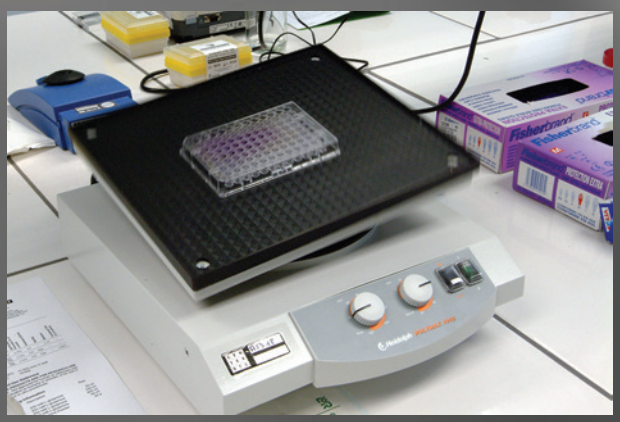
a sample is submitted to a CO2 laser beam to assess the following features under normal or oxygen enriched atmospheric conditions:

- initial ignition time
- damage caused by the combustion
- penetration of the laser beam

Biological evaluation of medical devices

To assess the health & safety risks of skin contact with medical devices, Centexbel examines their toxic effect on the skin according to **ISO 10993-5** "Biological evaluation of medical devices – part 5 - cytotoxicity: in vitro methods"





Mammal cells are brought into contact with a material extract. The cell toxicity is determined by measuring the viability of the cells by means of an MTT-test. This test measures the redox potential of the active living cells through a colorimetric reaction (reduction of MTT to coloured Formosan).

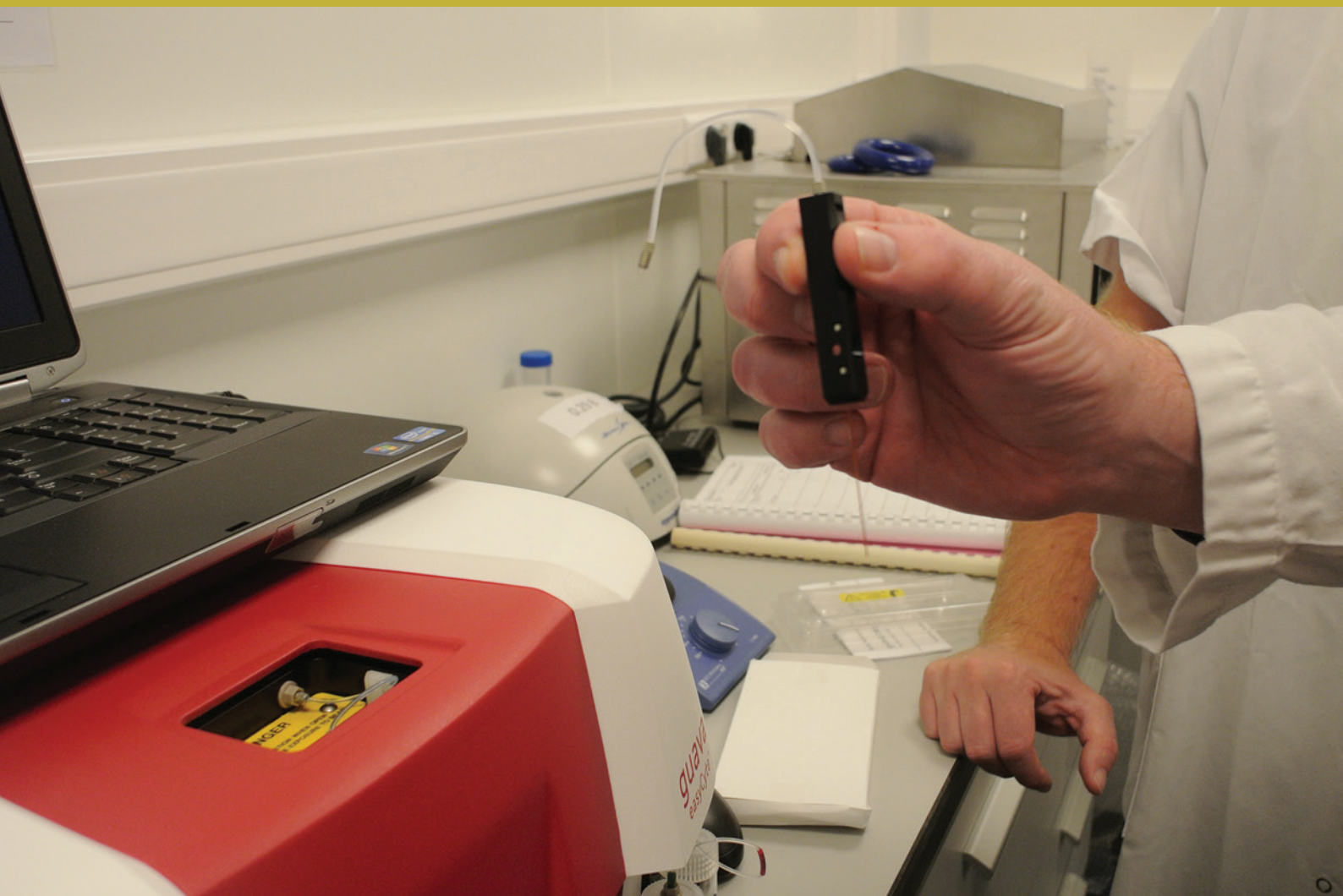
The intensity of the colouration corresponds with the number of living cells present during the test and with their metabolic activity. The results are expressed as a percentage of 100% viability (check). If the average cell viability of the tested samples is less than 70%, the textile extract is considered cytotoxic.

Flow cytometry to assess biocompatibility

Flow cytometry is a laser- or impedance-based, biophysical technology employed in cell counting, cell sorting, biomarker detection and protein engineering, by suspending cells in a stream of fluid and passing them by an electronic detection apparatus. It allows simultaneous multiparametric analysis of the physical and chemical characteristics of up to thousands of particles per second.

The process of collecting data from samples using the flow cytometer is called 'acquisition'. Acquisition is mediated by a computer connected to the flow cytometer, and the software which handles the digital interface with the cytometer.

Biocompatibilty is the extent to which materials can be used together or the extent to which a foreign material does not influence or deteriorate the biological environment in which it is inserted or brought into contact with. Medical textiles have to comply with increasingly severe requirements in the field of biocompatibility. Centexbel develops a test method to use the flow cytometer to perform in vitro biocompatibility tests as an alternative to the much disputed in vivo tests.



Comfort assessment

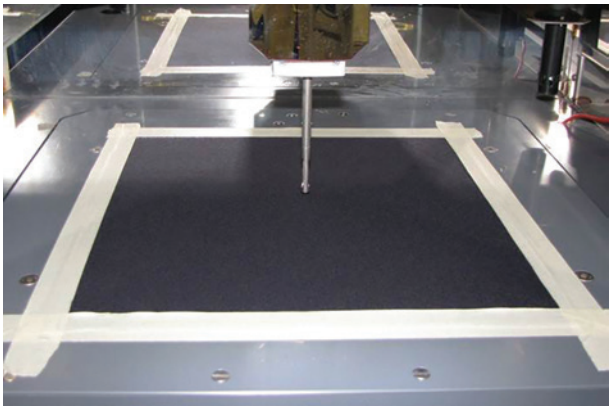
The comfort of textiles and garments is the result of both psychological aspects (design, fit, quality, aesthetics) and physiological aspects, including thermophysiological and sensorial (softness, suppleness) comfort.

Thermophysiological comfort is the result of the heat and moisture transfer through the textile that will regulate the body's temperature, and is an important feature in clothing and especially in sportswear and professional (protective) clothing.

Centexbel determines the thermal insulation (expressed in R_{ct}) and water vapour permeability (R_{et}), as well as the moisture management of fabrics and garments.

Skin model

The skin model or sweating guarded-hotplate is designed to obtain precise measuring data on the heat and moisture transmission through a flat (single layer) woven or nonwoven fabric and simulates the heat and moister transfer taking place in the approximity of the human skin. The test method is described in ISO 11092.

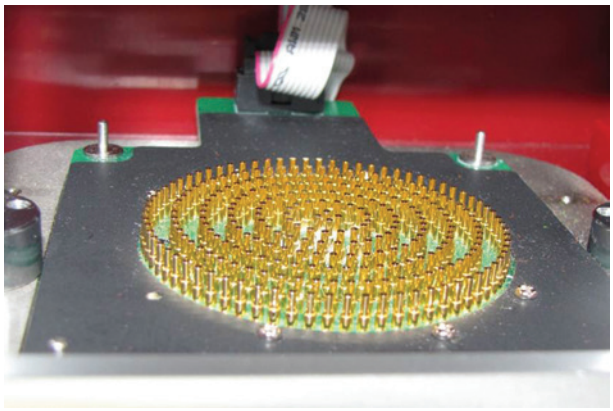


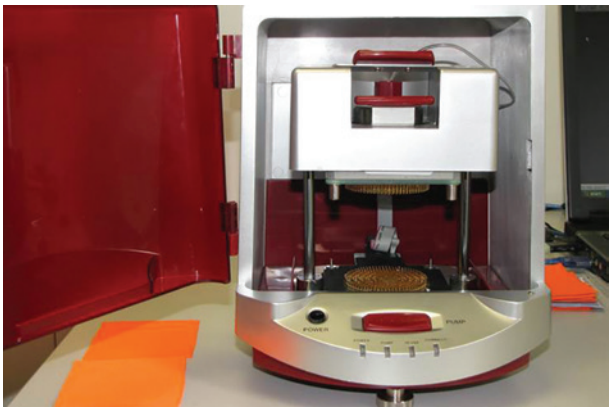
Newton, thermal and sweating manikin

Using the thermal, sweating and moving manikin we can predict the thermophysiological comfort of an entire garment (or parts) in real use conditions. The "Newton" manekin is composed of a thermally conductive carbon fibre-expoxy shell with incorporated thermal resistors and sensors.

Moisture Management Tester (MMT)

To measure the dynamic liquid transport properties, a a sample is placed horizontally in the instrument between the upper and lower sensors. These sensors are made of concentric rings of pins. A solution, representing perspiration, is dropped on the center of the upper face (skin side) of the test sample. As the solution moves through and across the sample, the changes in electrical resistance are measured and recorded.





Product Safety and Quality

REACH quick test package

Centexbel offers a set of tests to detect the presence of Substances of Very High Concern [SVHC], as defined by REACH legislation. This quick analysis enables manufacturers, textile finishers, importers, retailers and brands to meet the REACH SVHC obligations.

The actual list of SVHC includes a number of substances used in textiles and plastics:

- flame retardants: Decabromodiphenylether (Deca-BDE) Hexabromocyclododecane (HBCDD)
- PVC Softening agents: Benzyl butyl phthalate, Bis (2-ethyl(hexyl)phthalate) (DEHP), Dibutyl phthalate
- dyestuffs: Cobalt dichloride

The Centexbel REACH test package is developed to evaluate both preparations and products, detecting all substances of very high concern in a qualitative way.

The REACH test package includes

- thermal extraction at 120°C to detect the presence of organic compounds
- X-Ray Fluorescence measurement (XRF) to determine the heavy metals (Co, As), and/or halogens (Cl, Br) contents
- ICP-MS to determine the boron content
- LC-MS: additional test to detect the remaining substances of very high concern

X-ray fluorescence is used to identify elements from sodium to uranium. Mapping techniques visualise and provide an estimation of the concentration. The Orbis XRF analyser is equipped with a polycapillar lens, and measures spots from 30 µm to 2 mm.

Gas chromatography (GC) is a commonly used type of chromatography in analytical chemistry to separate and analyse compounds that can be vaporised without decomposition.

RSL in the prevention of harmful substances

The globalisation of the textile and plastic converting industry makes it increasingly difficult and complex to control the production flow and to exactly know the products (chemicals) that have been used. Morevover, consumers and their organisations want to be informed about the composition of the products they buy and demand that they do not contain harmful substances.

In order to avoid any negative publicity on health issues, it is only a matter of common sense to take preventive measures, such as the Restricted Substances List (RSL)

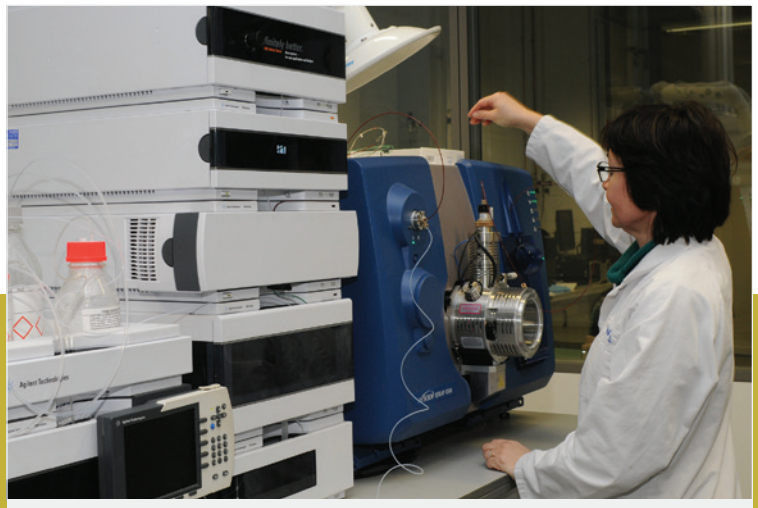
Centexbel will help you draw up your RSL list that may include harmful substances such as heavy metals (Ni, Cr, Pb), phthalates and polyaromatic hydrocarbons (PAK).

The RSL serves as the basis for an agreement between your company and your suppliers about the absence or restricted use of the listed substances.

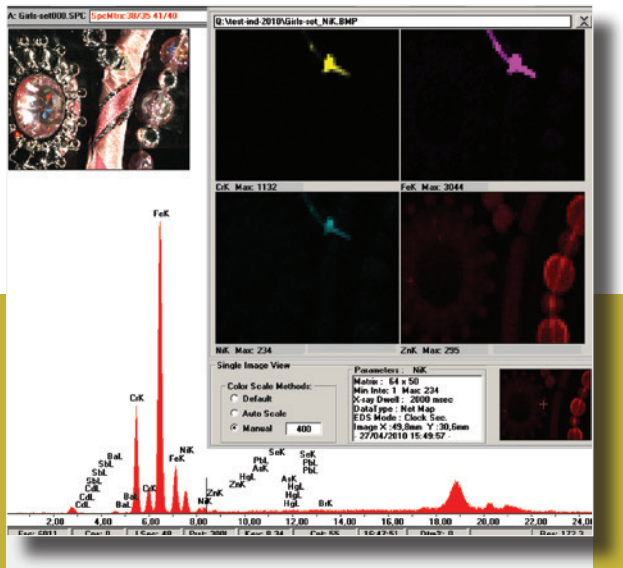
Centexbel assists your company in checking whether the rules are respected. In agreement with the company, a test programme will be set up to assess the conformity with the RSL. The test results are based on the use of a variety of testing techniques, such as:

- ICP-OES - quantitative determination of heavy metals
- GC-MS - Gas chromatography, combined with the mass spectrometer, provides information on alkylphenoles, corresponding ethoxylates, chlorophenols, organotin compounds, pesticides, phthalates, polyaromatic hydrocarbon, chlorobenzenes and toluenes
- thermal extraction precedes the analyses on the GS-MS, e.g. in the determination of dimethylfumarate, solvents and other volatile organic compounds (VOC)
- HPLC - liquid chromatography to determine azo and disperse dyestuffs
- specific and fast screening techniques (XRF and IR) to select critical compounds in complex articles before proceeding to an in-depth analysis of the relevant parameters

Centexbel assists your company in communicating the test results to your suppliers.



LCMS - Liquid Crystal Mass-spectrometer



XRF test result

Safety of toys

Whereas asphyxiation is the greatest and most direct risk linked with unsafe toys, more than 20% of the risks are due to their chemical composition (presence of hazardous substances) that also may provoke health issues in a child's later life. The requirements of the Toys Safety Directive 2009/48/EEC in the field of the chemical composition and migration of chemical substances are very strict and in line with REACH.

Manufacturers and importers of textile, plastic and wooden toys can appeal to the chemical laboratory of Centexbel-VKC for a very meticulous and precise screening of the chemical composition of their products.

Our very powerful equipment, our vast chemical library and the expertise of our lab assistants guarantee conclusive results on the safety of your toy products.

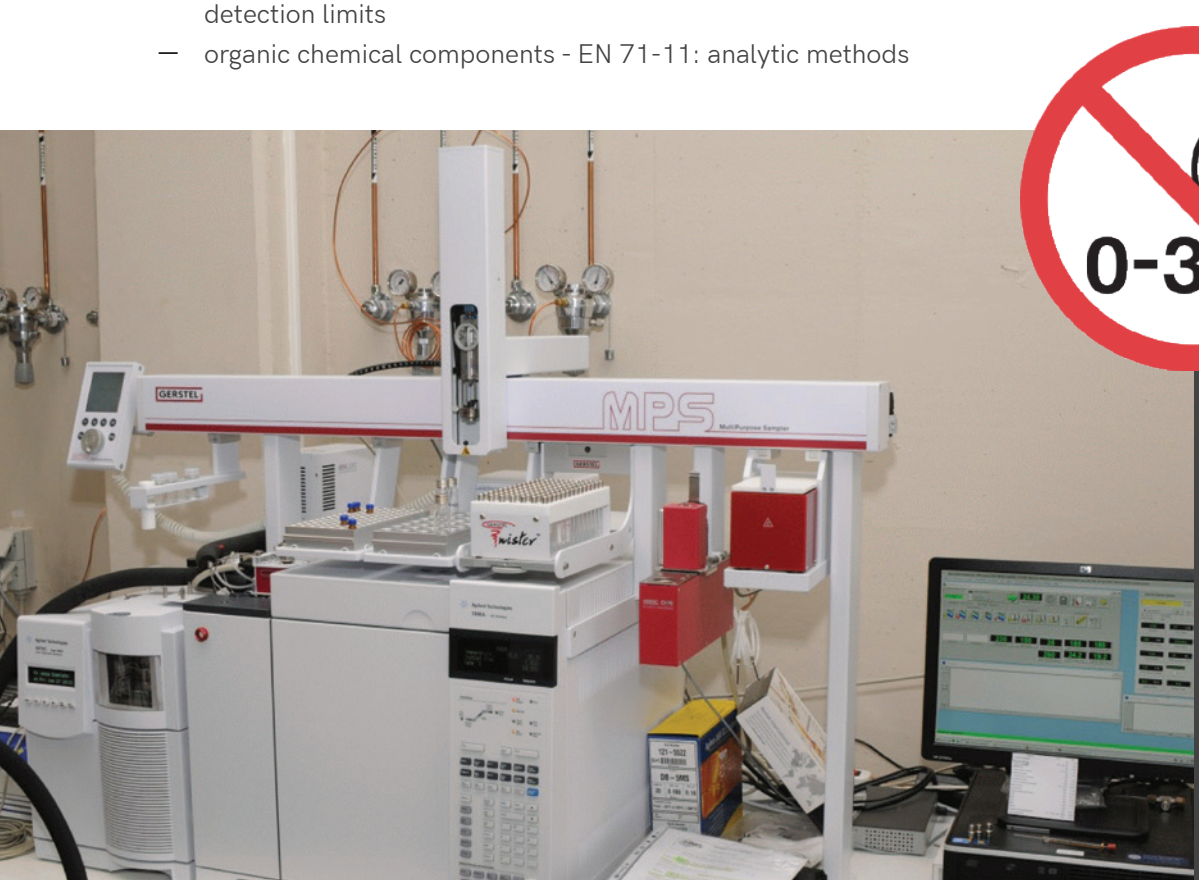
How do we proceed?

If a first and rapid qualitative screening detects any prohibited product, we will proceed to a thorough quantitative analysis that will provide you all data on the nature and quantities of unwanted substances.

EN 71: safety of toys describes the criteria and test methods toys have to comply with according to the Toys Safety Directive 2009/48/EEC.

Centexbel performs the following tests on toys:

- resistance to fire - EN 71-2
- migration of certain components such as heavy metals - EN 71-3
- finger paint - EN 71-7: requirements and test methods
- organic chemical components such as monomers, plasticisers, residues of coating solvents and lacquers, fire retardants, colorants - EN 71-9: requirements for toys likely which use may lead to mouth contact, inhalation, skin contact, eye contact, swallowing or sucking.
- organic chemical components - EN 71-10: preparation and extraction of certain organic components from toys depending on the type of material (polymers, textiles), the envisaged components and detection limits
- organic chemical components - EN 71-11: analytic methods



Dynamic Headspace: analysis of organo-chemical components

Emergency Relief Items

Emergency relief items used by humanitarian organisations in catastrophe-stricken areas (war, hunger, natural disasters, such as draught, floods, earthquakes, landslides …) should meet the strictest requirements to save lives. Centexbel has a long history of running tests according to the requirements defined by international humanitarian organisations, such as the UN refugee Agency (UNHCR), the International Red Cross, Médecins sans Frontières, Save the Children UK, and is therefore your preferred partner to perform tests on the equipment offered by manufacturers in the framework of international tenders.

UNHCR emergency relief items tested by Centexbel:

- thermal fleece blankets
- heavy duty plastic bucket
- semi-collapsible jerry cans
- tarpaulins in sheets or on rolls
- sanitary cloth
- family tent
- sleeping mats
- long lasting insecticide nets (LLIN)

Flexiburn

EN 13772: burning behaviour of curtains and drapes - vertical flame spread

The Flexiburn apparatus measures the vertical flame spread of curtains caused by the heat that is released in the event of a fire. The fabric is exposed to a large ignition source of radiant heat.

The Flexiburn test method is part of a series of three test methods, including ignitability (EN 1101) and flame spread (EN 1102). On the basis of these three tests, curtains and drapes can be classified according to the specifications of EN 13773 in five classes of fire safety.

example of rapid vertical flamespread and hence poor burning behaviour

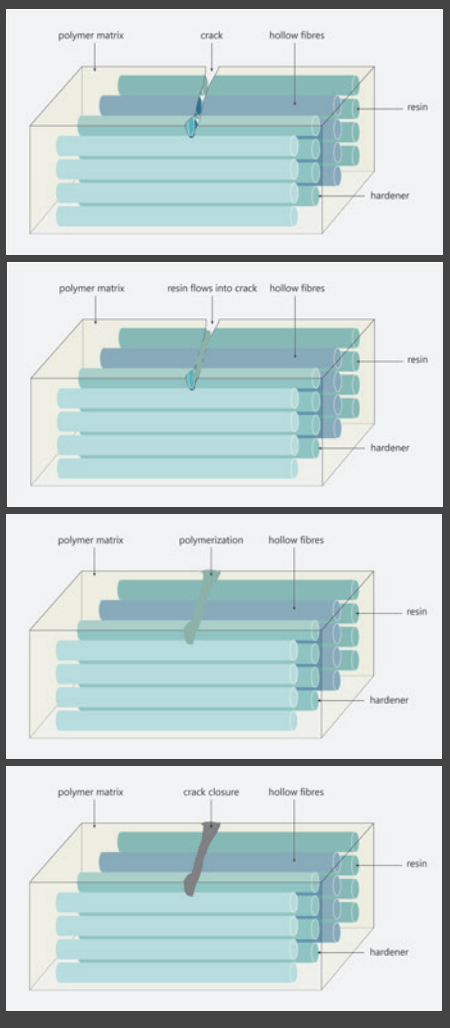
PILL test or surface flammability tests on small carpets and rugs for US market

All carpets and rugs manufactured, imported or sold in the United States must meet the flammability (acceptance) criterion of the standards (FF 1-70--Part 1630 Standard for the surface flammability of carpets and rugs and FF 2-70--Part 1631 Standard for the surface flammability of small carpets and rugs).

Small carpets and rugs not meeting the standard may be manufactured, imported or sold in the United States provided they are permanently labeled with the following statement: *"Flammable (fails u.s. department of commerce standard ff 2-70): should not be used near sources of ignition".*

Centexbel runs the PILL-test under ISO/IEC 17025 accreditation and is recognized for these tests by the US Consumer Product Safety Commission.

Scratch Resistance

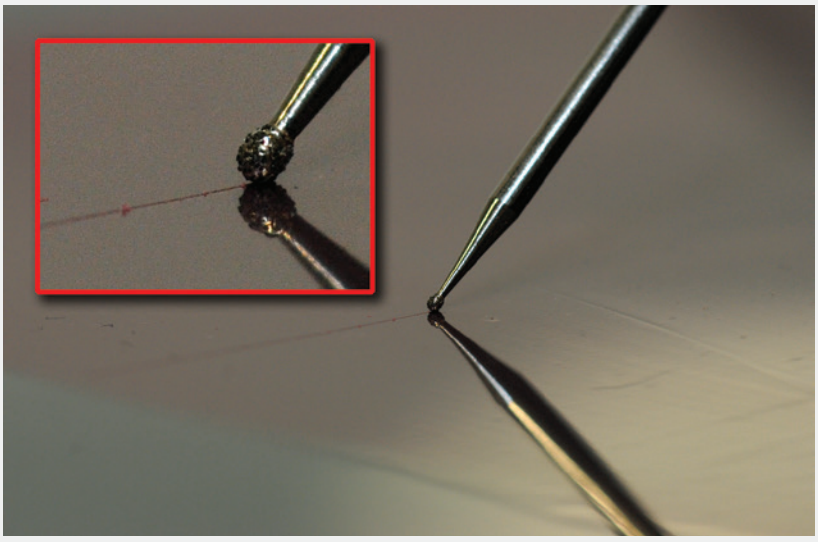


Principle of self-healing polymer coating

Pencil hardness test "scratch boy"

A simple, reproducible and effective technique to evaluate the hardness of coatings and other surfaces, such as floor coverings.

The pencil lead is maintained at an angle of 45° and pushed with uniform pressure onto the sample, leaving either a superficial trace or causing destruction to the substrate.



Centexbel adapted the apparatus to assess the self-repairing properties of coating layers

VOC and Formaldehyde

Centexbel performs analyses on home decoration materials according to:

- EN ISO 16000-2, 9
- ISO 16000-6
- EN ISO 16017-1

Equipment and testing procedure

- seven fully-equipped test chambers have been installed to release the compounds from the samples
- the emitted compounds are collected on an adsorbens and analysed by GC-MS
- simultaneous measurement of surface and bulk emissions of six samples
- quick analysis of formaldehyde and other carbonyls
- the analytic thermal desorption process is treated off-line allowing to place a new set of samples while the previous set is being analysed

Centexbel is accredited by GuT and Oeko-Tex® to measure emission and issue the corresponding certificates.

Micro-Chamber/Thermal Extractor™ (µ-CTE™)

EN ISO 16000

Centexbel is recognized for the whole range of test standards related to product emissions in simulated living rooms, including the evaluation schemes for the German (AgBB) and French (Affset) market and GuT eco-label.

Building materials and interior decoration products are major sources of emission of volatile organic compounds (VOC), a set of substances belonging to different chemical classes which all evaporate more or less quickly at room temperature: benzene, styrene, toluene, trichloroethylene and other highly volatile substances such as formaldehyde and acetaldehyde.

Fine dust or sick building syndrome

Centexbel offers an effective method to evaluate the health impact of fine dust of carpets on the in-door-air quality.

Equipment

- 9m^2 conditioned clean room
- equipped with dust particle counter

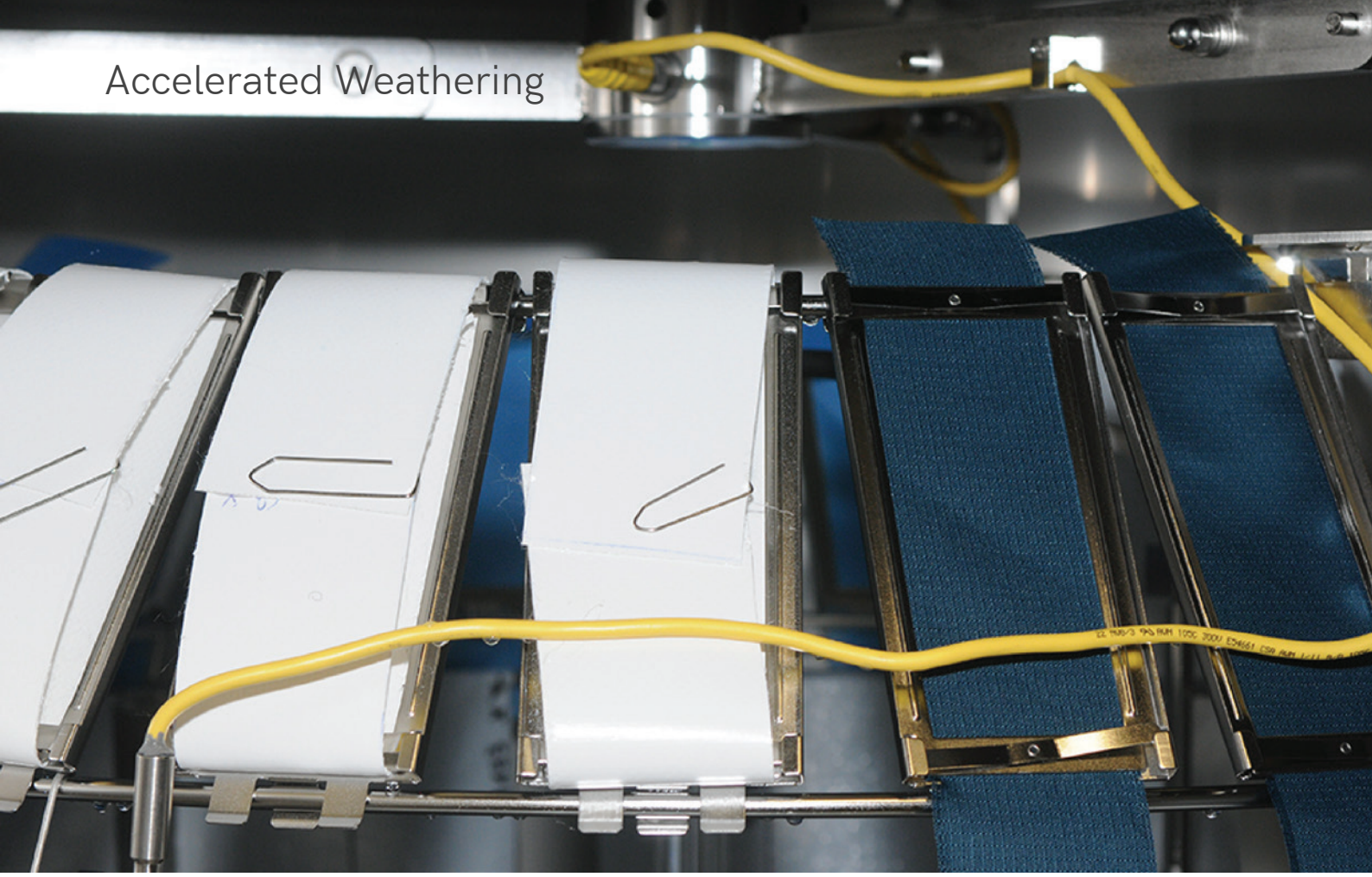
Procedure

- a carpet is artificially contaminated with fine dust particles
- the release of the particles in the air (caused by walking on the carpet) is measured

This method allows to compare different textile carpets and to assess textile carpets and other floor coverings regarding their ability to retain airborne dust particles.

Conditioned Clean Room

Accelerated Weathering



All materials degrade to a lesser of greater extent under the influence of weather conditions, leading to the detoriation of certain material properties or aspect changes, including decolouration, yellowing, loss of lustre/gloss, delamination, loss of strength and corrosion. Accelarated ageing or weathering tests simulate real life conditions, whereupon the influence of ageing on certain material properties can be evaluated.

Q-UV ageing test

- UV-light, temperature and humidity

Colour fastness to light

- decolouration of in- and outdoor fabrics exposed to light and/or rain
- EN ISO 105-B02 - exposure of indoor fabrics to xenon without UV-light
- EN ISO 105-B04 - exposure of outdoor fabrics to xenon with UV-light and sprinkling

Weathering

- material degradation resulting in decolouration and other deteriorations

The Weather-Ometer Ci4400 completes the Centexbel ageing lab

- samples are rotating around a 'xenon arc lamp'
- simulation of the full light spectrum
- optical filters alow to select certain zones of the spectrum
- monitoring of all variables, including radiation, spectral distribution, sample/reference temperature and humidity of the test chamber
- the samples are affected in different cycles (dry, rain phase and/or light/dark phase) allowing a vast and accurate simulation of natural aging conditions

Marine Equipment: Safety on Ships

Centexbel is a notified body (#0493) for conformity assessments in the framework of 2014/90/EU Marine Equipment Directive (MED). The Marine Equipment Directive covers any ship flying a flag of an EEA member state and is aimed at ensuring that equipment which has to meet the requirements of international conventions (e.g., SOLAS, MARPOL, etc.) agreed at IMO (the International Maritime Organisation), additionally meets a common standard of safety and performance.

It also ensures that certificates issued by European Union member states, or on their behalf by notified bodies, are acceptable to each member state through the harmonisation of their approval requirements.

Centexbel performs test on the following fire protection equipment on ships

MED/3.3 Firefighter equipment: protective clothing

MED/3.5 Firefighter equipment: protective gloves

MED/3.18 Surface materials and floor covering with a low flame spread:

a) decorative veneers;
b) paint systems;
c) floor coverings;
d) pipe insulation covers;
e) adhesives used in the construction of 'A', 'B' & 'C' class divisions;
f) combustible ducts membrane.

MED/3.19 Draperies, curtains and other suspended textile materials and films

MED/3.20 Upholstered furniture

MED/3.21 Bedding components

MED/3.9 Protective clothing resistant to the effects of chemical substances

Automotive & Transportation

Tests depend on the type of transportation means and the specifications defined by the manufacturer and brand (OEM). The (fire) safety requirements will be stricter for public transportation means allowing little or no escape in the event of an accident or fire (airplanes, trains, buses).

Centexbel is recognised by several car, aircraft, train and bus manufacturers to run test on:

safety

burning behaviour and flamespread

durability

material wear and tear (tensile, tear & bursting strength, water tightness, abrasion, pilling, colour fastness), ageing/weathering

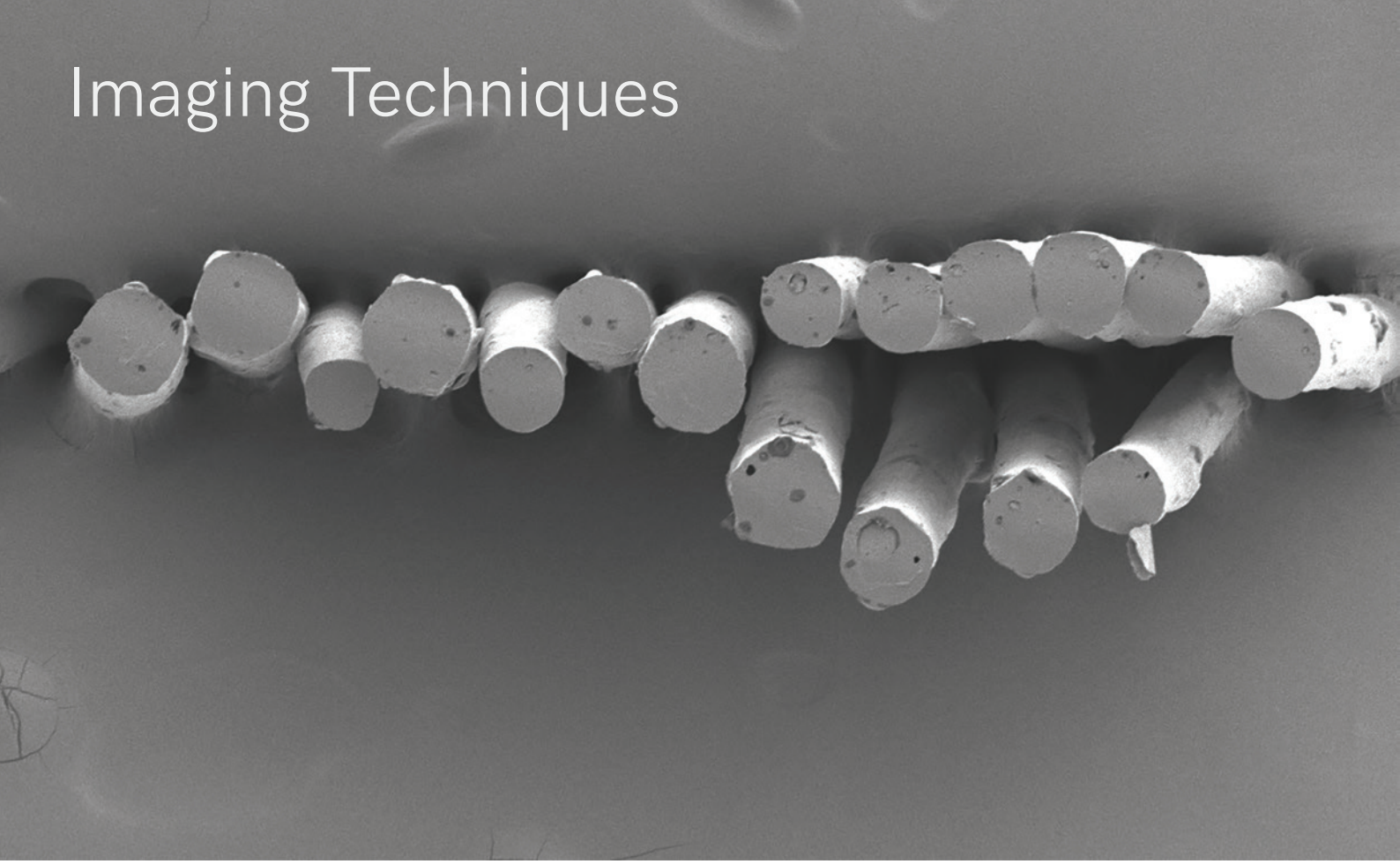
comfort

odour, resistance to humidity and mildew, soil release and oil repellency

in-car air quality

VOC emissions, fogging and formaldehyde release

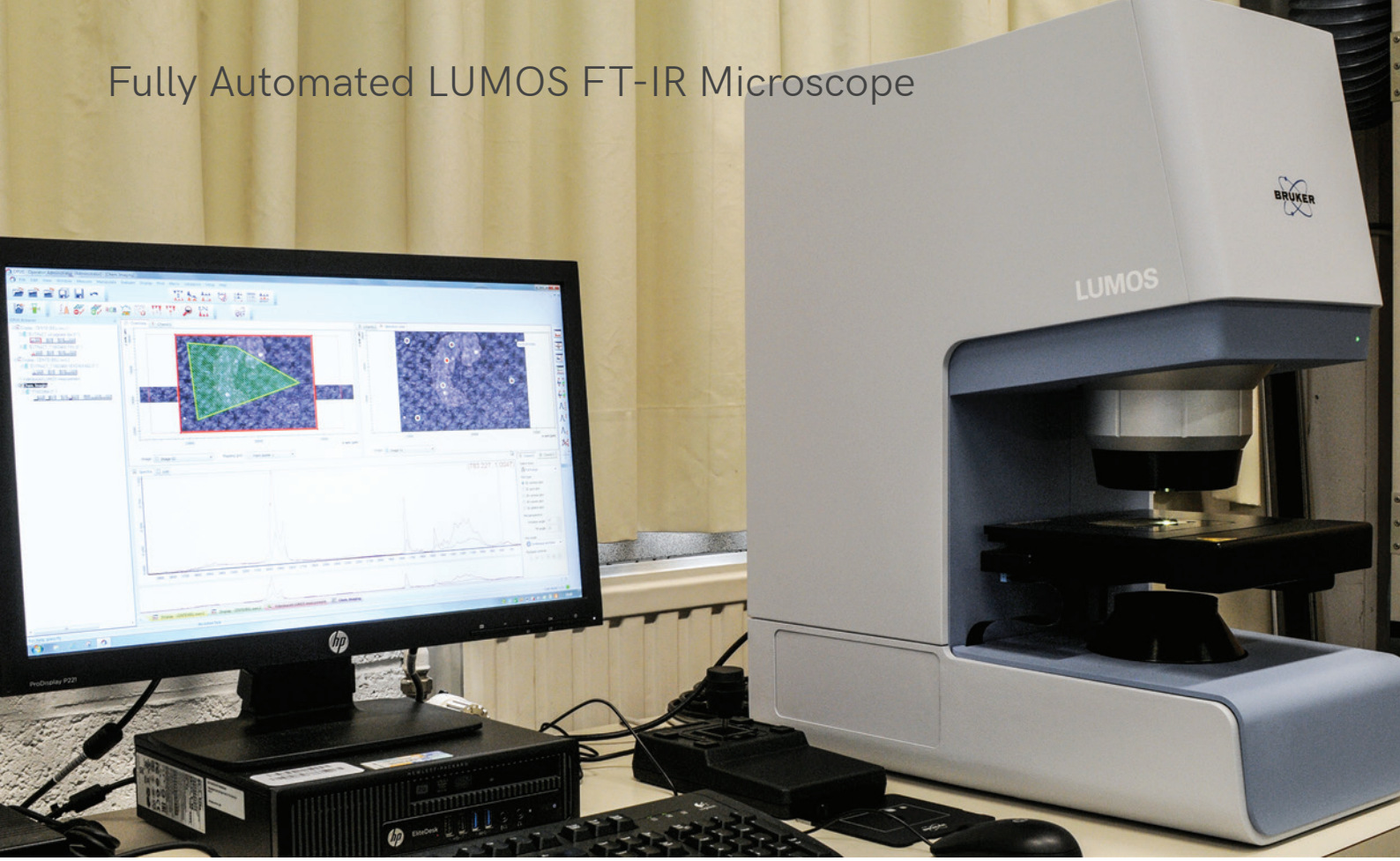
Imaging Techniques



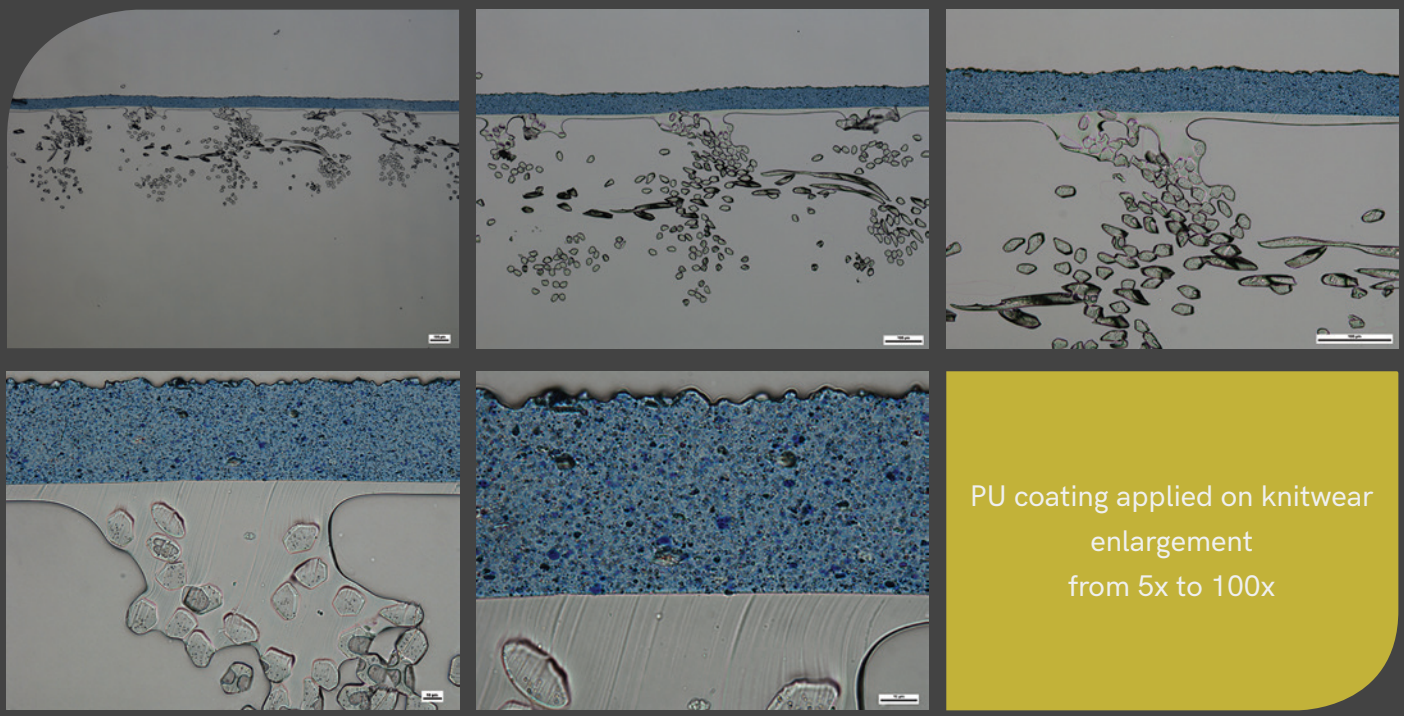
Scanning Electron Microscopy (SEM)

A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the sample's surface topography and composition. The electron beam is scanned in a raster scan pattern, and the beam's position is combined with the detected signal to produce an image. SEM can achieve resolution better than 1 nanometer. Specimens can be observed in high vacuum in conventional SEM, or in low vacuum or wet conditions in variable pressure or environmental SEM, and at a wide range of cryogenic or elevated temperatures with specialized instruments

Fully Automated LUMOS FT-IR Microscope

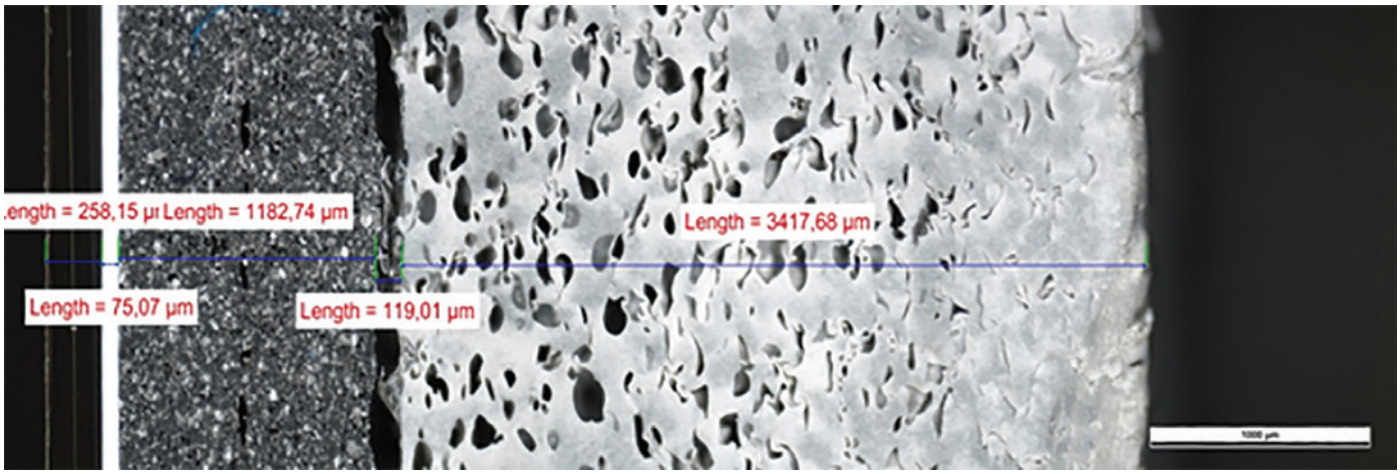


- visual inspection and infrared spectral analysis of micro samples
- fully automated measurement in attenuated total reflection (ATR), transmission, and reflection mode
- large working distance providing sufficient space for sampling motorized ATR crystal
- excellent quality in both IR and VIS range
- thanks to its exceptional sensitivity it is suitable for high demanding applications

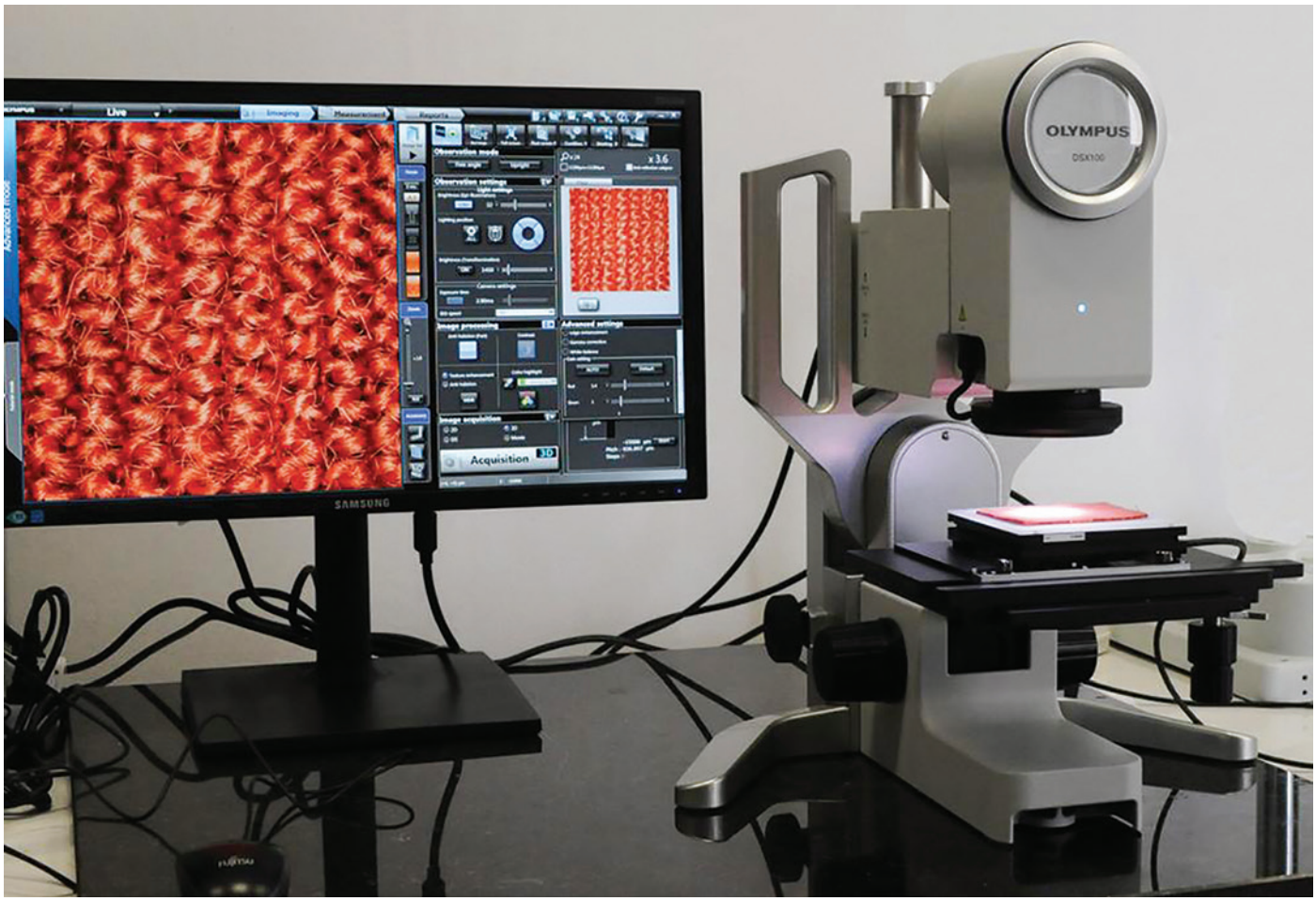


PU coating applied on knitwear
enlargement
from 5x to 100x

Microscopy and Image Analysis



The Nikon Eclipse LV Pol is a polarizing microscope capable of recording "step by step" images. These Z-stacks can be mathematically combined to yield 3D images. The stiching technique allows us to join different frames in an overview for image analysis.



The Olympus DSX 100 has an extreme depth of field and delivers very clear images. Combined with stitching, we get s a panoramic view of macro objects ("extended focal image"). Thanks to the free tilting feature, the samples can be viewed from all angles.

Accreditations

Certification: EN ISO/IEC 17065 | Testing: NBN EN ISO/IEC 17025: An attestation is granted by a third party related to a body for conformity assessment, such as a laboratory, an inspection or a certification body. This certificate is granted by an accreditation body after a thorough assessment based on internationally recognized requirements; it conveys the formal demonstration of the competence of the organization to carry out specific tasks relating to conformity assessment. Laboratories, inspection and certification bodies may, through accreditation, provide evidence of their technical abilities, but also of their independence and impartiality.

The International Association for Research and Testing in the Field of Textile and Leather Ecology (OEKO-TEX®) is a union of 18 independent textile research and test institutes in Europe and Japan and their worldwide representative offices. The member institutes are responsible for the joint development of test methods and limit values which form the basis of the product labels according to STANDARD 100 by OEKO-TEX®, MADE IN GREEN by OEKO-TEX® and LEATHER STANDARD by OEKO-TEX® as well as the production site certifications according to STeP by OEKO-TEX® (Sustainable Textile Production) and the chemical management tool DETOX TO ZERO by OEKO-TEX®. They are also entitled to carry out the corresponding laboratory tests and site audits.

Centexbel is recognised by GuT (Gemeinschaft umweltfreundlicher Teppichboden) as an independent testing institute to issue the GuT-ecolabel to carpets that are produced in an enviromental friendly manner, that contain no harmful substances and that can be recycled without polluting the environment.

The European Confederation of Linen and Hemp (CELC) is the only European agro-industrial organization federating all the stages of production and transformation for linen & hemp.

As Notified Body #0493, Centexbel assesses the conformity of products with the requirements defined by the Marine Equipment Directive 2014/90/EU.

Als Notified Body #0493, Centexbel assesses the conformity of products with the requirements defined by the PPE Regulation (2016/425/EC) - CE marking of protective clothing and gloves and by the CPR - Construction Products Regulation (305/2011/EC) - CE marking of floor and mural covering.

Consumer Product Safety Improvement Act (CPSIA) addresses, among other things, lead, phthalates, toy safety, third-party testing and certification.

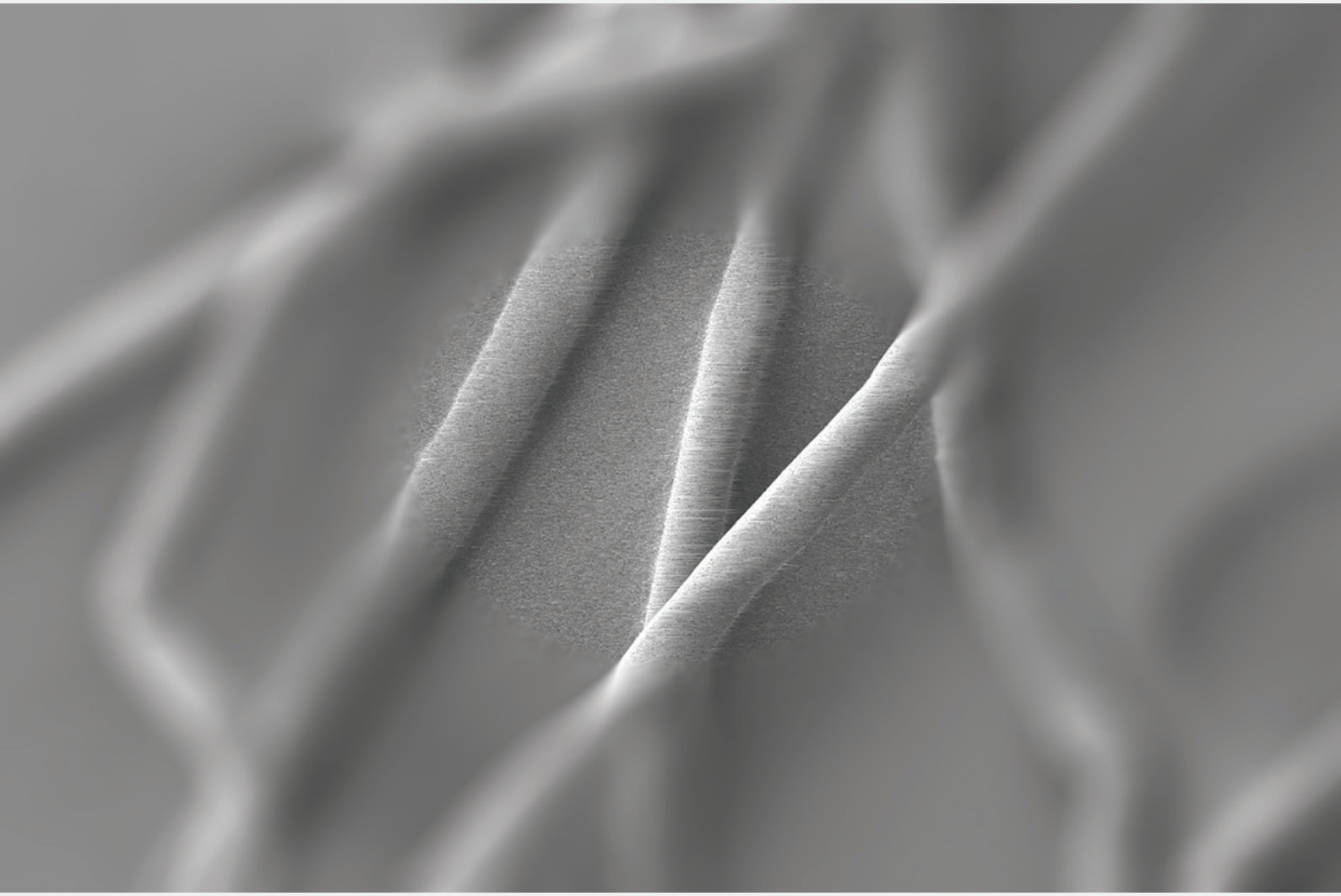
Crédit d'impôt recherche (CIR) - Direction de l'information légale et administrative (Premier ministre): General measure to support the activities of companies in the field of Research & Development.

CREATE

CONNECT

INSPIRE

SOLVE



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