



Technical data

The PPE* EN standards (*PPE = Personal Protective Equipment)

Classification of personal protective clothing according to European PPE Directive 89/686/EEC (PPE Regulation (EU) 2016/425)

Types 1a, 1b and 1c (ET) – gas-tight protective suits



EN 943-1:2015+A1:2019 (CPS/protective suits permissible for industry/works fire brigades in Europe)
Protective clothing against dangerous solid, liquid and gaseous chemicals, including liquid and solid aerosols - Part 1:
Performance requirements for Type 1 (gas-tight) chemical protective clothing, including supplementary standards:

- EN ISO 13688:2013: Protective clothing - General requirements (ISO 13688:2013)

- EN 388: Protective gloves against mechanical risks

- EN 14325:2018 Protective clothing against chemicals - Test methods and performance classification of chemical protective clothing materials, seams, joins and assemblages

- EN 1073-1:2016+A1:2018: Protective clothing against solid airborne particles including radioactive contamination - Part 1: Requirements and test methods for compressed air line ventilated protective clothing, protecting the body and the respiratory tract

- EN standards for breathing apparatus: EN 132, EN 136, EN 12021, EN 13274, EN 14593, EN 14594

EN 943-2:2019 (CPS/protective suits permissible for voluntary and professional firefighters in Europe)
Protective clothing against dangerous solid, liquid and gaseous chemicals, including liquid and solid aerosols - Part 2:
Performance requirements for Type 1 (gas-tight) chemical protective clothing for emergency teams (ET), including supplementary standards:

- EN 943-1:2015+A1:2019 and its supplementary standards

- EN 15090:2012, Footwear for firefighters

- ISO 17491-1: Protective clothing against dangerous solid, liquid and gaseous chemicals, including liquid and solid aerosols.

EN 943: INFO IDENTIFICATION IN ACCORDANCE WITH STANDARD (product label/user manual)
Code 1a, b and c = type classification (according to EN 943-1:2015+A1:2019)

- 1a = internal SCBA/totally encapsulated suit, gas-tight (ET = Emergency Teams)
- 1b = external SCBA/totally encapsulated suit, gas-tight (ET = Emergency Teams)
- 1c = without SCBA, with forced air/totally encapsulated suit, gas-tight (industry)

EN 943: Worldwide acceptance

EN 943 for protective clothing has been the European standard since 2002 and is recognised and used throughout the world and applied in Asia, the Middle East, South America and Australia. Protective suits for the US economic area, where the NFPA Regulation applies, are excluded.

EU standards compared with US NFPA standards

The US NFPA regulations cannot be compared in detail with the European standards. Both of these standards (EN/USA) will, independently of each other, guarantee that the aim of protecting the wearer/end user (gas-tightness, heat and chemical resistance) is fulfilled.

ISO 17723-1:2019-08

PPE ensembles for firefighters undertaking hazardous materials response activities - Part 1: Gas-tight, vapour-protective ensembles for emergency response teams (type 1). Protective suits according to EN 943 Parts 1 and 2 comply with ISO 17723-1:2019.

Important information regarding DIN, EN and ISO standards – please ensure you follow these instructions

- Validity of EN standards in Europe: In Europe, only harmonised EN standards have full legal validity. Any additional national requirements or directives that go beyond or deviate from the EN standards are not permitted and do not comply with EU law. Only EN 943-1:2019 (industry) and EN 943-2:2019 (firefighters) – including all associated audited sub-standards – guarantee maximum protection against gas ingress for users and full insurance cover under European law. Special national directives do not constitute a valid basis for insurance cover, as they circumvent European standards and are therefore misleading.

- Inappropriate product labelling: Protective suits that do not meet the European minimum requirements of EN 943 (chemical/mechanical/gas-tight) but are nevertheless advertised as “gas- and air-tight” are not permitted. TESIMAX explicitly refers to such products as “fake suits”.

- Check the manufacturer’s labelling: Always ensure that the chemical protective suit (CPS) bears a complete and correct manufacturer’s label: type classification (1–6/ET), standard references, pictograms, CE marking, test number, notified body.

- Check the product certificate: Only use products with a valid certificate that clearly identifies and classifies the product in accordance with EN standards.

- Check the manufacturer’s quality management system: Ensure that a valid quality management system is in place in accordance with the relevant modules (e.g. DIN ISO, Module C, Module B, MED).

Overview of other types of EU protective suits (EN standards)

Type 3 – Liquid-tight protective suits

EN 14605:2005+A1:2009 Protective clothing against liquid chemicals with liquid-tight connections.
This also applies to partial body protection PB [3].



Type 4 – Spray-tight protective suits

EN 14605:2005+A1:2009 Protective clothing against liquid chemicals with spray-tight connections. This also applies to partial body protection PB [4].



Type 5 – Particle-tight protective suits

EN ISO 13982-1:2004 + A1:2010 Protective clothing for use against solid particulates (full-body protection).
EN ISO 13982-2:2004 Test method for determination of inward leakage of aerosols of fine particles.



Type 6 – Protective suits with limited spray-tightness

EN 13034:2005+A1:2009 Protective clothing offering limited protective performance against liquid chemicals (Type 6/PB [6]).



Extended standards, specifications, material tests:

Protective clothing against infective agents

EN 14126:2003

Protective clothing - Performance requirements and test methods for protective clothing against infective agents
EN 14126:2003/AC:2004
Corrigenda to EN 14126:2003



Protective clothing tested according to EN 14126 guarantees resistance to the penetration of biologically contaminated liquids (germ penetration when wet). The special requirements for protective clothing materials against infective agents guarantee the protection of the skin and the wearer against possible contact with biological substances and help to prevent the spread of germs. Protective suits certified according to EN 14126 can be recognised by the pictogram for biological hazards and by the suffix “B” in the label/designation (e.g. type 3-B). The EN 14126 standard stipulates the following tests for the material of protective clothing:

Penetration test with artificial blood (ISO/FDIS 11603)

Resistance to viruses (ISO/FDIS 16604)

Resistance to bacteria (ISO/DIS 22610)

Resistance to bio aerosols (ISO/DIS 22611)

Resistance to contaminated dust (ISO/DIS 22612)

NOTE: Letter “B” in the product label (B = biological)

Protective suits with antistatic properties

Observe explosion protection (EN 1149-1) for working in explosion risk areas (Zones 0–22). The static inhibitor is effective only when the relative humidity lies above 30 percent. Note that only the clothing fabric is dissipative. To avoid sparks generation, make sure that protective clothing and wearer are properly earthed and use static inhibitor.



Protective suits for maritime use

(maritime shipping)

Protective suits tested and approved according to the MED (Maritime European Directive) Annex A1. SOLAS 74/88 Chapter II/2 Regulation 19.3.6.1



Protective suits for nuclear protection

EN 1073-1:2016+A1:2018

Protective clothing against solid airborne particles including radioactive contamination - Part 1: Requirements and test methods for compressed air line ventilated protective clothing, protecting the body and the respiratory tract



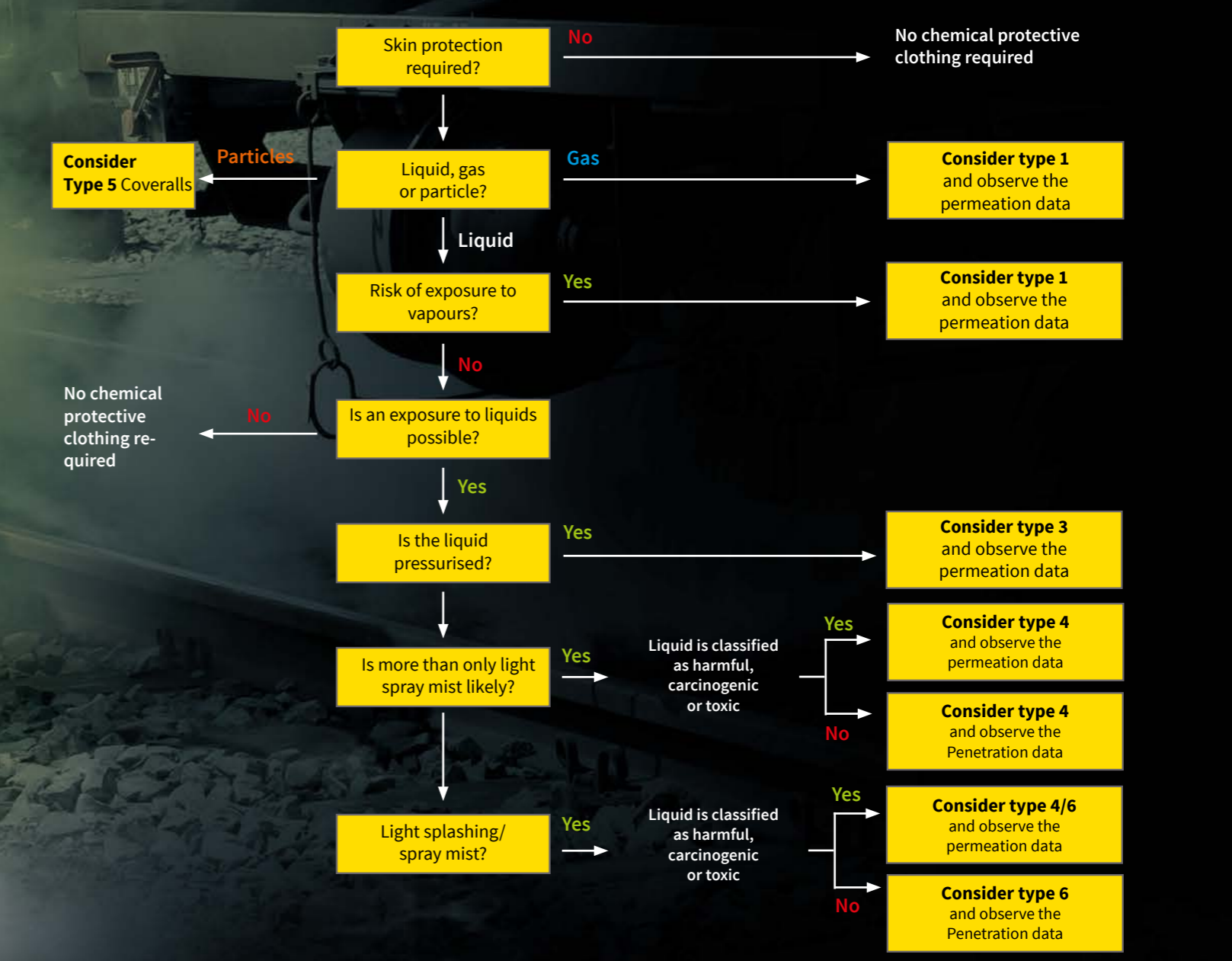


Your guide for the right chemical protective suit (CPS of types 1 to 6 according to EN standards)

Protective suit quick selector by specifications and protection level (Types 1 to 6)

Important note:
 This chart is a highly simplified quick selection aid. To determine the right chemical protective clothing for your specific application, a personal consultation with TESIMAX is always necessary. The responsibility for assessing the risks and hazard potential ultimately always lies with the end user, who therefore also has full liability (risk assessment according to national/international regulations). The end user should be a suitably qualified safety specialist.

- For further (detailed) information see also:
- The technical Appendix of this catalogue
 - The user manual, incl. maintenance videos (separate customer information; please enquire)
 - Our website (short CPS presentation videos)
 - Contact TESIMAX directly; see www.tesimax.de.



The base layer made of 100% para-aramid

In extreme situations, take advantage of the safety of TESIMAX para-aramid advanced quality Used in protective suits made of SYKAN® 4 and SILVERFLASH®:

Basic properties:

In extreme situations, take advantage of the safety of TESIMAX protection suits with para-aramid base fabric. Used in protective suits made of SYKAN® 4 and SILVERFLASH® with the following performance characteristics:

- Excellent resistance to decomposition under heat
- Outstanding tensile strength and fatigue resistance: the fibres have five times the strength of steel at the same weight
- Excellent cut and puncture resistance
- Para-aramid fabrics are very lightweight
- Superior resistance against chemicals
- Long-term dimensional stability
- Low weight
- Heat- and low-temperature resistant
 - Up to +180 °C, para-aramid retains its room-temperature properties almost unchanged.
 - Does not melt and is self-extinguishing
 - Its charring point is at +425 °C.
 - No significant embrittlement or strength reduction down to -196 °C.

TESIMAX is known throughout the world for its use of this high-performance material in its SYKAN® 4 and SILVERFLASH® chemical protective suits, having used para-aramid for more than 40 years. Our suits thus protect the suit wearer in extreme conditions – with a proven track record throughout the world.

Available only for models made of SYKAN and SILVERFLASH



PARA-ARAMID

INSIDE/OUTSIDE COATING made of 100% HPE (high-performance elastomer)

In extreme situations, take advantage of the safety of TESIMAX HPE elastomer – Advanced Quality Used in protective suits made of SYKAN® 4 and SILVERFLASH®:

Basic properties:

- Very good resistance to chemicals and gasses (low air permeability)
- Very high mechanical strength
- Self-extinguishing – the flame-retardant materials are incorporated in the fabric's fibres and remain harmless when they decompose (environment-friendly and safe for wearer)
- No fabric softener (environmentally friendly and safe for wearer)
- Electrically insulating (very good protection in hazardous (Ex) areas)
- Excellent ageing resistance (extremely ozone-resistant and long-term colourfast)
- A long service life even under dynamic load and harsh deployment conditions.
- High elasticity and long service life, proven in practice
- Wide temperature range – continuous temperatures of -40 °C to +150 °C and -100 °C to +850 °C
- Excellent abrasion-resistance and mechanical strength
- High reuse potential – low operating costs and fewer non-usage times
- Nano-effect outer skin: very low to zero adhesion to all substances

Available only for models made of SYKAN and SILVERFLASH



High Performance Elastomer

The chemicals resistant HPP protective barrier

In extreme situations, take advantage of the safety of TESIMAX HPP barrier – Advanced Quality Used in protective suits made of SYKAN® 4 and SILVERFLASH®:

Basic properties:

- Outstanding resistance to nearly all chemicals, gasses, particles and liquids.
- Excellent mechanical properties
- Flexible and elastic
- Outstanding electrical properties
- Free from additives – pure fabric of foodstuffs grade 9
- High temperature resistance
- Very low to zero adhesion to all substances



High Performance Plastics

High-performance plastics laminate

In extreme situations, take advantage of the safety of TESIMAX HPP barrier – Advanced Quality Used in protective suits made of SYKAN® 4 and SILVERFLASH®:

The fabric combines a low-noise polypropylene non-woven fabric with chemicals resistant high-performance plastic laminates, thereby providing a robust, functional basis for highly effective protection.



Performance PLASTICS

PERFORMANCE TP

In extreme situations, take advantage of the safety of TESIMAX HPP barrier – Advanced Quality Used in protective suits made of SYKAN® 4 and SILVERFLASH®:

PERFORMANCE TP
A smart adaptation of the HPP technique described, but with limitations on use with chemicals (e.g. solvents) and temperature range (-30 °C to +70 °C)



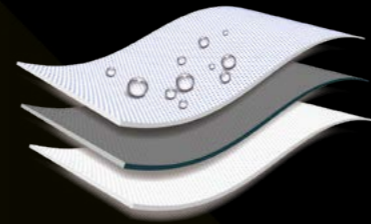
Performance TP

Fabric T/T plus*

The T/T plus fabric is a newly developed spunbonded nonwoven, multi-layer polypropylene fabric with outstanding wearing and protection properties.

- Outstanding abrasion resistance, tear resistance and seam strength for a long service life
- Special protection is offered by the very high impermeability to dust (protection against radioactive dust) and the excellent impermeability index against numerous water-soluble chemicals. Despite these outstanding protection properties the fabric offers an excellent wearing comfort.
- Special feature, T:(Type 5-6, colour: white or blue), breathable, particle-tight, antistatic
- Special feature of T plus: (Type 4-6, colour: white), breathable, particle- and spray-tight, antistatic

T PLUS

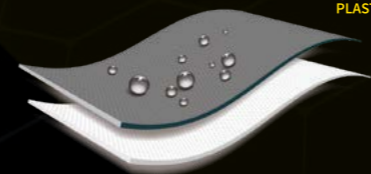


PE-D fabric*

The PE-D fabric (Duoform®) has good electrical properties, carries no electrostatic charge and has a residual potential discharge time that is neither too long nor too short. Protective clothing with seam covering with heat-activated adhesive tape (also Types 4, 5 and 6), with excellent NBC (nuclear, biological and chemical) protection and limited flame-retardance; self-extinguishing (Type 3b, colour: yellow)

- APPLICATION AREAS: Pest control; emergency operations after incidents with propagation and leakage of hazardous substances; petrochemical industry; metal processing; mining; production; treatment and transport of chemicals; military; waste processing; water treatment; veneering; PCB reconditioning, firefighters
- The PE-T material: The Tessaform® PE-T fabric offers increased mechanical as well as biological and high-quality chemical protection and is particle-tight (radioactive particles), liquid-tight and antistatic.
- The fabric offers superior mechanical properties for a limited-use protective suit (Type 3-B, colour: grey).

ESK 1 PE-D



S3/S5 PE-T

CHEMBA® fabric*

The CHEMBA (Eptaform) fabric consists of a highly chemicals-resistant barrier laminate on the inside and outside (double wall construction), with a mechanically robust spun-lace fleece sandwiched between the two layers (dual safety). Provides maximum protection, especially against mechanical impact (puncture resistance class 3 according to EN 943). The unique technology offers the superior, unlimited safety in use. Nevertheless, the VS 5 CHEMBA protective suit is ultra-light and flexible. Bright orange signal colour for increased work safety.

- Excellent chemical protection and gas-tightness tested according to EN 943-2 ET for 15 reference chemicals, tested for over 150 chemicals with up to 8 h resistance
- Outstanding protection against gases, tested against liquid war gases according to Finabel 0.7 C, Ostinato standard with up to 24 h resistance
- Good protection against contaminated liquids (tested according to EN 14126 B)
- Good dust-tightness (e.g. radioactive particles; tested to EN 1073-2)
- High mechanical stability, including high-quality sewn and thermo-taped seam covers
- Gas-tight zip with cover panel made of suit material
- Good wearing comfort through ultra lightweight design (less than 2 kg for VS 5 CHEMBA!)
- Non-adhering top layers for better decontamination (nano effect)
- Good antistatic and insulating properties (tested to EN 1149 in combination with static inhibitor)
- Semi-rigid, flexible multi-layer barrier visor, antifog for a clear field of vision, excellent chemical resistance corresponding to the suit fabric.

Colour: ■ signal orange

CHEMBA®



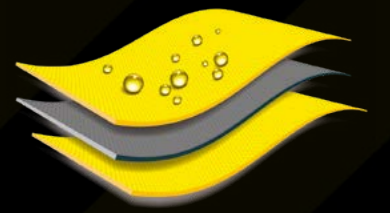
POLYRAN®-L-S fabric*

Solid PA base fabric coated on both sides with performance thermoplastic and permanently sealed with a special varnish (silk gloss/fungicidal finish).

Characteristics

- Extremely light-weight and flexible
- Reusable, washable, very good mechanical properties (wear-, tear- and puncture-resistant)
- Excellent chemical resistance to most acids and alkalis
- Low gas permeability (single war gas test)
- Applications: In (maritime) industry, pharmaceuticals, clinics or as training suit for firefighters and for decontamination measures
- Colour: ■ yellow (L), ■ red (S) or ■ Nato olive (s)

TP
POLYRAN®-L/-S



SYKAN® 1 fabric

The gas- and liquid-tight, chemicals-resistant fabric structure consists of five layers. The fabric has a robust high-performance base fabric (HPA) coated on both sides with chemically resistant, abrasion-resistant high-performance elastomers (HPE).

The outside has a signal colour, the inside is grey. In addition, the fabric structure features a unique chemicals barrier (HPP film), facing outwards, above the base fabric and one under the fabric. This means:

- Outstanding chemical resistance; gas and liquid-tight (biological agents).
- Protection against all aerosols (viruses, bacteria) and particles (solids).
- Reinforced robust design (tensile and tear resistant, bending and abrasion resistant, puncture resistant, excellent seam strength)
- Superior flexibility, ultra-low weight
- Thermally stable at high and cryogenic temperatures
- Flame-retardant with integrated protection against deflagration (flash fire tested at approx. +850 °C)
- Decontamination-resistant, washable, reusable, sustainable
- Good ageing, weathering and ozone resistance, simple storage
- With antistatic coating

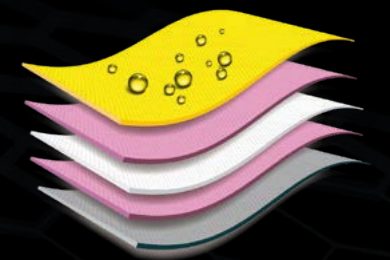
- Exterior colour: Signal colour yellow ■ or orange ■ for increased occupational safety
Nato-olive ■ for protection and defence

- Applications: Pharmaceuticals, clinics, military and civil defence, industry, maritime and fire brigades (unlimited)

Together with the patented Ultra seam, superior suit components and innovative extras, TESIMAX suits offer the ultimate CBRN protection for the wearer – a world first. Safe in use. Reusable. Chemicals and thermally resistant, reinforced robust design.

For further information, see the material sample card and the technical data.

SYKAN® 1





High Performance Elastomer High Performance Plastics

* For further information, see the material sample card and the technical data.

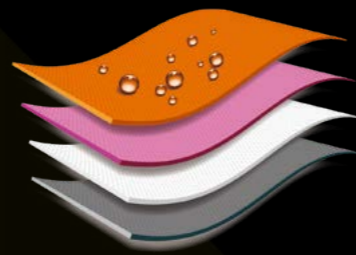
SYKAN® 2 fabric

The gas- and liquid-tight, chemicals-resistant fabric structure consists of four layers. The fabric has a robust high-performance base fabric (HPA) coated on both sides with chemically resistant, abrasion-resistant high-performance elastomers (HPE). The outside has a signal colour, the inside is grey. In addition, the fabric structure features a unique chemicals barrier (HPP film), facing outwards, above the base fabric. This means:

- Outstanding chemical resistance; gas and liquid-tight (biological agents).
 - Protection against all aerosols (viruses, bacteria) and particles (solids).
 - Reinforced robust design (tensile and tear resistant, bending and abrasion resistant, puncture resistant, excellent seam strength)
 - Maximum flexibility, low noise, low weight
 - Thermally stable at high and cryogenic temperatures
 - Flame-retardant with integrated protection against deflagration (flash fire tested at approx. +850 °C)
 - Decontamination-resistant, washable, reusable, sustainable
 - Good ageing, weathering and ozone resistance, simple storage
 - With antistatic coating
- Exterior colour: Signal colour orange  for increased occupational safety
Nato-olive  for protection and defence
- Applications: Pharmaceuticals, clinics, military and civil defence, industry, maritime and fire brigades (unlimited)

Together with the patented Ultra seam, superior suit components and innovative extras, TESIMAX suits offer the ultimate CBRN protection for the wearer – a world first. Safe in use. Reusable. Chemicals and thermally resistant, reinforced robust design.



SYKAN® 2



SYKAN® 4 fabric

The gas- and liquid-tight, chemicals-resistant fabric structure consists of four layers. The fabric has a robust high-performance base fabric (HP para-aramid) coated on both sides with chemically resistant, abrasion-resistant high-performance elastomers (HPE). The outside has a signal colour, the inside is grey. In addition, the fabric structure features a unique chemicals barrier (HPP film), facing outwards, above the base fabric. This means:

- Outstanding chemical resistance; gas and liquid-tight (biological agents).
- Protection against all aerosols (viruses, bacteria) and particles (solids).
- Reinforced robust design (tensile and tear resistant, bending and abrasion resistant, puncture resistant, excellent seam strength)
- Maximum flexibility, low noise, low weight
- Thermally stable at high and cryogenic temperatures:
 - Permanently stable at temperatures from -30 to +60 °C
 - Short-term stable at temperatures from -100 to +100 °C in active use
 - Short-term contact up to -178 °C (liquid nitrogen, hydrogen, nitrogen)
 - Hot steam temperatures: material tested at approx. 350 °C for up to 30 s, full contact at approx. 6 bar steam pressure
 - Flame-retardant with integrated protection against deflagration (flash fire tested, short-term approx. +850 °C)
 - > Original Shield or Max FR functional wear/undersuits from TESIMAX recommended
- Decontamination-resistant, washable, reusable, sustainable
- Good ageing, weathering and ozone resistance, simple storage
- With antistatic coating

- Exterior colour: Signal colour yellow  for increased occupational safety
Nato-olive  for protection and defence

- Applications: Pharmaceuticals, clinics, military and civil defence, industry, maritime and fire brigades (unlimited)

Together with the patented Ultra seam, superior suit components and innovative extras, TESIMAX suits offer the ultimate CBRN protection for the wearer – a world first. Safe in use. Reusable. Chemicals and thermally resistant, reinforced robust design. For further information, see the material sample card and the technical data.

SYKAN® 4



SILVERFLASH® fabric*


The gas- and liquid-tight, chemicals-resistant fabric structure consists of five layers.

The outer fabric is a permanently antistatic heat and radiation shield combined with internal and external chemicals barriers (HPP film).

The fabric has a robust high-performance base fabric (HP para-aramid) and is coated on the inside with HPE elastomers (red).

The unique features:

- Outstanding chemical resistance; gas and liquid-tight (biological agents).
- Protection against all aerosols (viruses, bacteria) and particles (solids).
- Reinforced robust design (tensile and tear resistant, bending and abrasion resistant, puncture resistant, excellent seam strength)
- Superior flexibility, ultra-low weight
- Thermally stable at high and cryogenic temperatures:
 - Permanently stable at temperatures from -30 to +60 °C
 - Short-term stable at temperatures from -100 to +100 °C in active use
 - Short-term contact up to -178 °C (liquid nitrogen, hydrogen, nitrogen)
 - Hot steam temperatures: material tested at approx. 350 °C for up to 30 s, full contact at approx. 6 bar steam pressure
 - Flame-retardant with integrated protection against deflagration (flash fire tested, short-term approx. +850 °C)
 - > Original Shield or Max FR functional wear/undersuits from TESIMAX recommended
- Blocks radiant heat, tested at approx. 1000 °C wall of flame in a closed/open space
- Decontamination-resistant, washable, reusable, sustainable
- Good ageing, weathering and ozone resistance, simple storage
- Permanently antistatic

Exterior colour: Silver reflective  for increased occupational safety

- Applications: Pharmaceuticals, clinics, military and civil defence, industry, maritime and fire brigades (unlimited)

Together with the patented Ultra seam, superior suit components and innovative extras, TESIMAX suits offer the ultimate CBRN protection for the wearer – a world first. Safe in use. Reusable. Chemicals and thermally resistant, reinforced robust design.

SILVERFLASH®



* For further information, see the material sample card and the technical data.

SEAM TECHNOLOGY

High-performance seam technology

On normal protective suits, the seam is often the weak point.

The TESIMAX-developed seam technology, which is used on all of our protective suits, is superior to conventional seams.



The TOP seam

The TOP seam, for:

- The TESIMAX limited-use protective suits (made of SMS50/Punti-form, Duoform, Tessaform or Eptaform/CHEMBA)
- The TESIMAX industry and training protective suits as well as environmental protection products (made of POLYRAN-L/-S)
- Here the high-strength seams are sealed with seam covers made of the same material.
- This process fuses the materials together to form a homogeneous, 100% impermeable fabric
- Exceptionally resilient against liquids, gasses, particles and chemicals, while retaining outstanding elasticity



High Performance
Plastics

The ULTRA seam

The ULTRA seam for protective suits made of SYKAN and SILVERFLASH

- High quality sewn with chemically and thermally resistant para-aramid thread.
- External seam cover with a welded high-performance elastomer tape (HPE), i.e. thermo-welded to the fabric.
- The tape has a unique, integrated chemicals barrier (HPP film) similar to the protective suit fabric. This is necessary for the tape to offer the same resistance as the protective suit fabric, especially against diffusion-prone aggressive solvents and gases.
- The outer tape of the SILVERFLASH suit is additionally aluminised and is applied using a special process.
- Additional, internal HPE welded tape for increased safety

Advantages

- Outer protective barrier that is exceptionally resilient against high and low temperatures, gasses, particles and aggressive chemicals, while retaining outstanding elasticity.
- Facilitates repairs – REAL REUSABLE
- Safety sewing thread made of para-aramid used in all protective suits – thermally stable and chemicals-resistant.



High Performance
Plastics

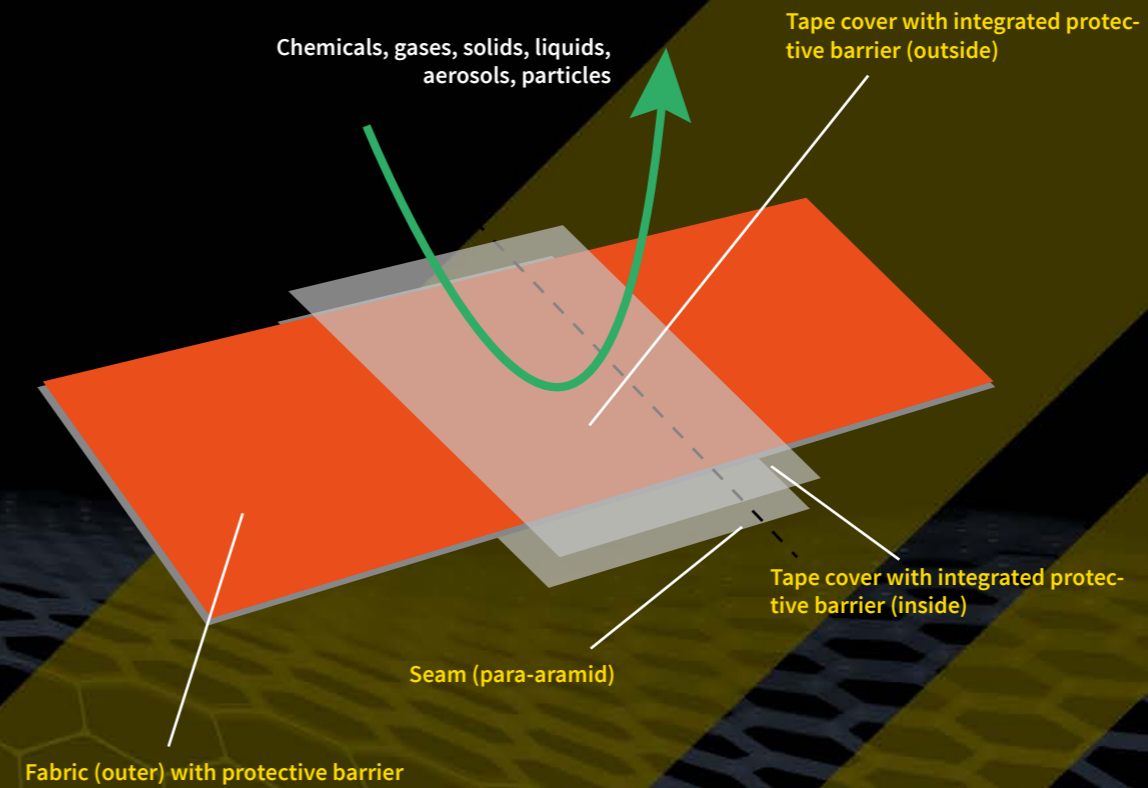


High Performance
Elastomer



PARA-ARAMID

POWER PERFORMANCE SEAM TECHNOLOGIES



The ULTRA seam cover

Outside: Seam covered with HPE welded tape with unique, integrated chemicals barrier (HPP film)

Middle: Protective suit base fabric

Inside: Protective suit fabric
Seams covered with HPE welded tape



REAL-REUSABLE

Chemical resistance

Chemical permeation values – material tables in accordance with EN 943/EN 14325
For further chemical data, see the TESIMAX permeation list.

Basics

- Chemicals resistance is assessed in accordance with EN 943 using 15 reference chemicals (including chemical warfare agents).
- The breakthrough time is the key factor: the longer the permeation time, the safer the material.
- Protective suits compliant with EN 943 must achieve at least Class 2, (TESIMAX suits achieve Class 3, i.e. ≥ 60 minutes) for all 15 reference chemicals – the minimum standard for fire services and emergency teams.

Classification & requirements

- Permeation classes in accordance with EN ISO 6529 (6 classes, based on permeation times in minutes).
- EN 14325 also requires the time taken for a defined mass of chemical to penetrate the fabric to be specified.
- TESIMAX is rated at $0.1 \mu\text{g}/\text{cm}^2/\text{min}$ and ≥ 480 min; therefore, no re-evaluation of existing data is required.
- The performance bar shows the minimum requirements of EN 943 for each fabric.

Key testing methods

1. EN 374-3 – Permeation rate $1.0 \mu\text{g}/\text{cm}^2/\text{min}$
2. ISO 374 Permeation rate 1.0 or $0.1 \mu\text{g}/\text{cm}^2/\text{min}$
3. ASTM F739 – Permeation time at $0.1 \mu\text{g}/\text{cm}^2/\text{min}$
4. EN 14325 – Test methods and performance classification
5. EN ISO 6530 – Resistance to penetration of liquids

Scope of the EN 943 assessment (TESIMAX)

The information always refers to the entire protective suit, including:

- integrated gloves & boots/footlets
- Pressure relief valves & forced-air feedthrough
- Zips & covers
- Seams
- Visors (VS series)
- Face-seal with a respiratory mask

Summary: Cross-references & notes on permeation data

*1 = Class 1/2 not achieved \rightarrow unsuitable for prolonged exposure.

** = Enhanced protection against permeation thanks to an additional zip cover made of suit fabric; in the case of gases, an additional benefit is provided by the suit's internal pressure. The cover is resistant to solid, liquid and gaseous chemical warfare agents (Finabel 0.7.C).

*** = For footlets with drip cuffs, follow the safety instructions in the user manual; approved protective boots must be worn.

**** = Select protective gloves based on a risk assessment; TESIMAX recommends certified gloves and optional overgloves (please enquire).

***** = For further permeation times for chemicals / CWA / CWS, see TESIMAX permeation list.

Permeation classes (EN 14325/ISO 6529)

- Class 1: ≥ 10 min
- Class 2: ≥ 30 min
- Class 3: ≥ 60 min
- Class 4: ≥ 120 min
- Class 5: ≥ 240 min
- Class 6: ≥ 480 min

Safety notice

Protective suits that have been contaminated or subjected to thermal or mechanical stress must be inspected and serviced. Failure to check may result in serious injury or death. If in doubt, please contact the TESIMAX Servicepool. For guidance on safe reuse, refer to the TESIMAX user manual.



Chemical resistance

Overview of permeation resistance against chemicals, gasses and warfare agents for TESIMAX protective suits according to EN 943 Parts 1 and 2 (ET)

Chemical	Protective suit fabric	Chemical	protective suit fabric	Chemical	
• Dichloromethane	(1) - 6	• Toluene	(1) - 6	• Mustard gas (HD)	x > 17 h
• n-heptane/n-hexane	(1) - 6	• Methanol	(1) - 6	• Lewisite (L)	x > 1.5 h
• Acetone	(1) - 6	• Ethyl acetate	(1) - 6	• Soman (GD)	x > 2.0 h
• Acetonitrile	(1) - 6	• Tetrahydrofuran	(1) - 6	• Sarin (GB)	x > 2.0 h
• Diethylamine	(1) - 6	• Carbon disulphide	(1) - 6	• Tabun (GA)	x > 6.0 h
• NaOH-sol40%	(1) - 6	• Sulphuric acid 96%	(1) - 6	• VX	x > 6.0 h
• Ammonia	(1) - 6	• Chlorine	(1) - 6		
• Hydrogen chloride gas	(1) - 6				

* Breakthrough times according to EN 943 Parts 1 and 2 (ET); for individual values see test certificate
The chart gives the reference values for the materials/seams Class 6 according to EN 943 Part 2 (ET). For other tested values, see the respective user manual or the Technical data appendix in the catalogue.

** Permeation times according to Finabel 0.7.L (given are minimum values for SILVERFLASH and SYKAN); the following are also CWA-tested: seam, visor (respiratory mask), protective gloves (WIPAN B+/C/CK/CK+/overglove), protective boots (HPE versions 1-4) and the zip with cover/assemblages.

Note: Further information and performance characteristics, see the corresponding user manual and the TESIMAX Chem Data list. For further information please enquire.

Correlation of classification and time

Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
< 10 min	> 30 min	> 60 min	> 120 min	> 240 min	> 480 min

PERFORMANCE LEVEL

Classification of Chemical Resistance rating to EN 943

15 reference chemicals, including war gasses, and further permeation data by fabric. The reference chemicals specified in EN 943 are usually the least harmful of their kind (for the reason, see EN 943-2 D Appendix A and for further information, the TESIMAX Chemguide). Gas-tight protective suits with a good performance, e.g. (Class 6, x > 8.0 h) usually also have a good general chemical permeation resistance.

The normalised permeation time (permeation resistance in minutes) of the reference chemicals according to EN 943 for TESIMAX protective suits are mostly >480 minutes (maximum, for the criterion 0.1 µg/min/cm²; see TESIMAX chem data list).

These suits therefore offer outstanding protection for the end user.

The performance bar is based on the chemical minimum requirements of EN 943 (see above) and provides a summary for each fabric or protective suit.

Chemical resistance:

0% 100%



The most important test methods for determining permeation times and permeation rates:

1. EN 374-3 defines a standardised permeation rate of 1.0 µm/cm²/min
2. ISO 6529:2001 defines the determination of results with normalised permeation rates of 1.0 µm/cm²/min or 0.1 µm/cm²/min (->TESIMAX REAL REUSABLE TEST)
3. ASTM F739 specifies that the results must be recorded as permeation time at 0.1 µm/cm²/min.
4. EN 14325:2018
EN 14325:2018: Protective clothing against chemicals – Test methods and performance classification of chemical protective clothing materials, seams, joins and assemblages
5. EN ISO 6530
Protective clothing - Protection against liquid chemicals - Test method for resistance of materials to penetration by liquids (ISO 6530:2005)

Chemical resistance

What is the permeation or breakthrough time?

The breakthrough time (also referred to as permeation time) is the key parameter for assessing a material's protective performance against chemicals. It indicates how long it takes for a specified concentration of a chemical to diffuse from the outside to the inside. The longer the breakthrough time, the safer and more suitable the fabric or protective suit is.

In accordance with EN ISO 6529, the results place the fabric into one of six classes. Protective suits compliant with EN 943 must achieve at least Class 2 (>30 minutes) for all 15 reference chemicals. This is the minimum requirement for firefighting and emergency teams.

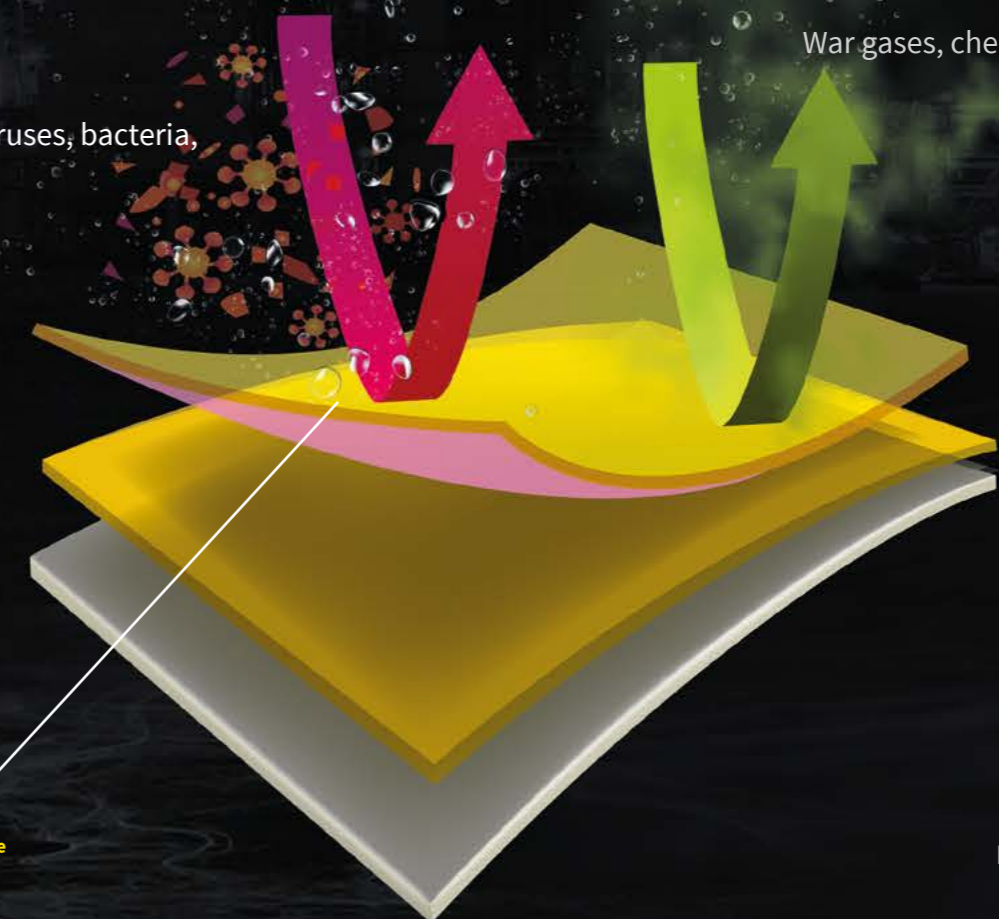
Further details are available on request.

Protective suits made of SYKAN or SILVERFLASH fabric have the following key advantage over all other protective suits in the world:

Only protective suits with an outer chemically resistant, gas and liquid tight barrier film (protective barrier) provide maximum safety and reusability. It is crucial that the protective barrier lies outside the base fabric. -> This is the only way of guaranteeing that no gas or chemical attacks the base fabric through contamination and the mechanical properties (puncture, tensile, tear and tear propagation strengths) remain permanently intact.

Particles, viruses, bacteria, blood

War gasses, chemicals



Mechanical resistance

Laboratory-determined permeation data does not always reflect real-life conditions. Variables such as temperature, pressure and mechanical loads can influence the permeation times. When selecting chemical protective clothing, these physical properties must therefore also be tested. European standard EN 943 provides the best basis for comparing the physical properties of chemical protective suits (CPS). **Even the best barrier fabric has no effect if it is torn, cut, punctured or otherwise damaged.**

For limited-use and reusable CPS, observe the following performance characteristics according to EN 943 and EN 14325:

Requirement	Limited-use	Reusable
Abrasion resistance	Class 4	Class 6**
Flex cracking resistance	Class 1	Class 4**
Flex cracking resistance at low temperatures (-30 °C)	Class 2	Class 2**
Tear propagation strength (trapeziom method)	Class 3	Class 3**
Tensile strength	Class 4	Class 6**
Puncture resistance	Class 2	Class 3**
Ignition resistance	Class 1	Class 3**
Seam strength:	Class 5	Class 5

Further classes:
TENSILE FORCE TESTING to EN 943
Class 1 (lowest) to Class 6 (highest)

*NOTE ACCORDING TO EN 943-2

The difference between normal durability (limited-use garments) and increased durability (TESIMAX REAL REUSABLE garments) protective suits lies in the strength and durability of the fabric or the suit design or both. Increased durability is provided for those tasks where the suits are expected to be exposed to high mechanical stress or will be repeatedly reused.

-> The EN 943 standard clearly states that only reusable protective suits (TESIMAX REAL REUSABLE made of POLYRAN, SYKAN and SILVERFLASH) must be used in the front line under all types of risk without limitation.

**Note:

- For performance characteristics, see the respective user manual.
- Protective suits to 943 Part 1 have lower performance levels.

What mechanical performance criteria must a protective suit for my application fulfil?

Basic rule:

Light-duty use: Limited use with standard durability

Heavy-duty use: Reusable suit with increased durability



REAL-REUSABLE

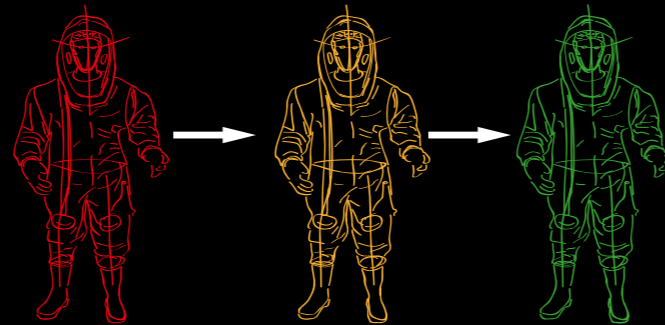
"REAL REUSABLE" protective suits must exceed the more stringent mechanical minimum requirements for reusable suits according to EN 943.

These minimum requirements are necessary for uses in which the suits are likely to be exposed to high mechanical stresses or if the suit will be used multiple times.

These suits also have a higher resistance to chemicals (see Chemical performance).

They are therefore the first choice for maximising the safety of emergency teams that are faced with unknown hazards.

For further information please enquire.



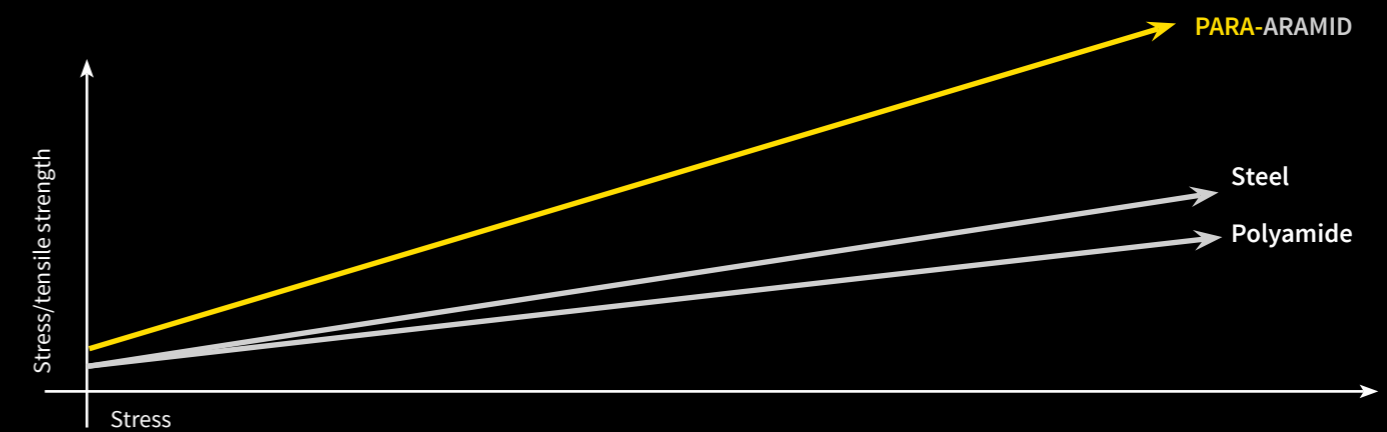
Further TESIMAX facts on mechanical resistance:

In extreme situations, take advantage of the safety of TESIMAX protection suits with para-aramid base fabric. Used in protective suits made of SYKAN® 4 and SILVERFLASH® with the following performance characteristics:

- Excellent resistance to decomposition under heat
- Outstanding tensile strength and fatigue resistance: the fibres have five times the strength of steel at the same weight
- Excellent cut and puncture resistance
- Para-aramid fabrics are very lightweight
- Superior resistance against chemicals
- Long-term dimensional stability
- Low weight
- Heat- and low-temperature resistant
 - Up to +180 °C, para-aramid retains its room-temperature properties almost unchanged.
 - Does not melt and is self-extinguishing
 - Its charring point is at +425 °C.
 - No significant embrittlement or strength reduction down to -196 °C.

TESIMAX is known throughout the world for its use of this high-performance material in its SYKAN® 4 and SILVERFLASH® chemical protective suits, having used para-aramid for more than 40 years. Our suits thus protect the suit wearer in extreme conditions – with a proven track record throughout the world.

FOCUS: Mechanical resistance



PERFORMANCE LEVEL: Classification of fabric performance properties (Table 3):

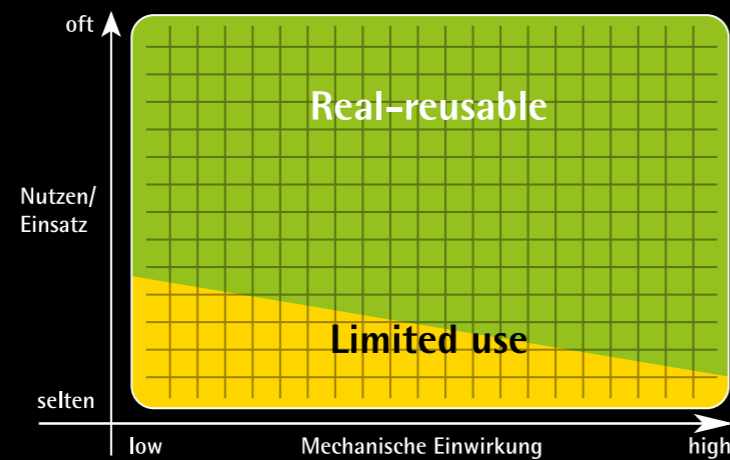
The performance bar is based on the mechanical minimum requirements of EN 943/EN 14325 (see above) and provides a summary for each fabric or protective suit.

Mechanical resistance:



0%

100%





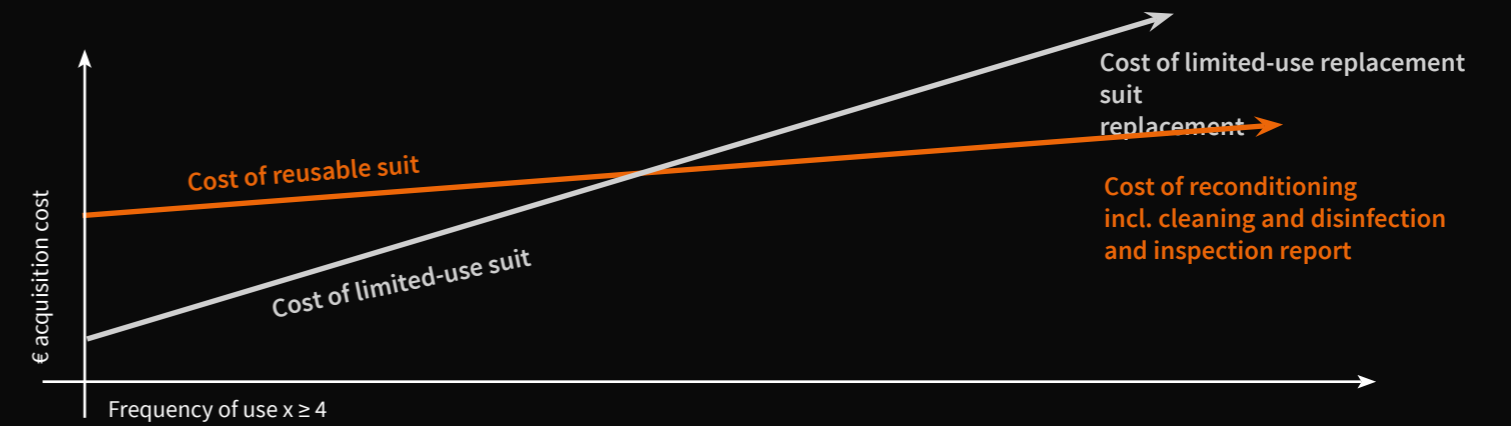
Economic viability of the TESIMAX REAL REUSABLE protective suits:

If suit will be used, for example, more than four times within 15 years, we recommend reusable protective suits. These offer a higher protection level and are more cost-effective in the long term than limited-use protective suits, which must be replaced with new ones after each use.

More than 90 % of reusable protective suits can be reconditioned (see also our Servicepool leaflet).

LIMITED-USE VS. REUSABLE

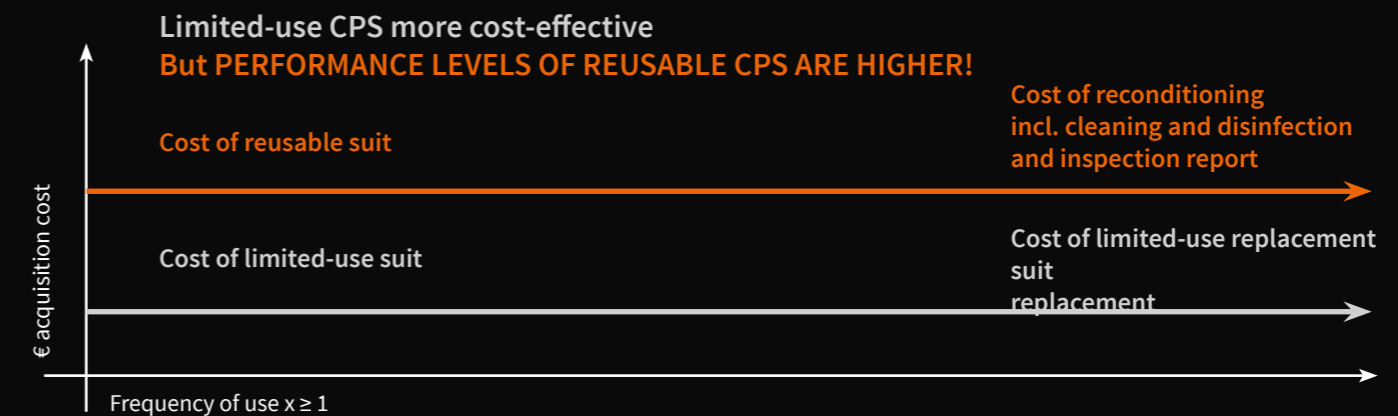
Economic efficiency for use under mechanical strain: reusable CPS more cost-effective in 90% of cases



Economic efficiency for use under light/moderate contamination: REUSABLE CPS more cost-effective in 90% of cases



Economic efficiency in case of severe contamination: DISPOSABLE CPS more cost-effective in 90% of cases



Thermal resistance

PERFORMANCE LEVEL

Classification of fabric performance properties

The performance bar is based on the thermal minimum requirements (see above) and provides a summary for each fabric or protective suit.

Heat:

Contact heat at approx. 850 ± 50 °C
(approx. 5 seconds, then still gas-tight)
according to EN 13274-4

0% 100%



Contact heat at approx. 850 ± 50 °C
(approx. 10 seconds, then still gas-tight)
according to EN 13274-4 2 (double):



* Superheated steam at approx. 350 ± 25 °C
(approx. 30 seconds, then still gas-tight/reusable) at up to 10 bar pressure/
full contact



*/** Flashover Test at approx. 850 ± 50 °C
(approx. 8 seconds, then still gas-tight)
according to ISO 13506:2008



*/** Radiant heat at approx. 1000 °C
Distance approx. 2–3 m (approx. 1–3 minutes,
then still gas-tight) plus EN ISO 11612



Cold:

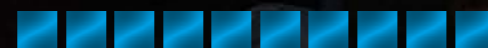
Contact cold* at -30 °C according to EN 943
(for up to 4 minutes, then still gas-tight/
reusable) e.g. ambient temperatures
in winter



Contact cold* at -80 °C according to EN 943
(for up to 30 minutes, then still gas-tight/reusable), e.g. ammonia



Contact cold* at -100 °C according to EN 943
(for up to 30 minutes, then still gas-tight/reusable), e.g. liquid nitrogen



*in combination with TESIMAX FR underclothing

EXPANSION RISK

At high (up to 850 °C at 8 seconds full contact) or low temperatures (-196 °C at 10 seconds full contact or -80 to -100 °C at up to 30 minutes full contact), the risk of, for example, mechanical material fatigue increases, which can result in tearing or leakage of the protective fabric.

For suits that protect against this situation, see the Heat/cold resistance performance bar graph for each suit or fabric.

For further information please enquire.

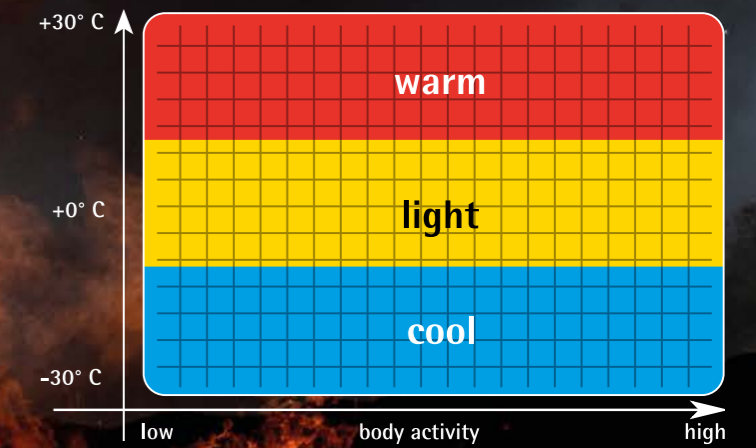
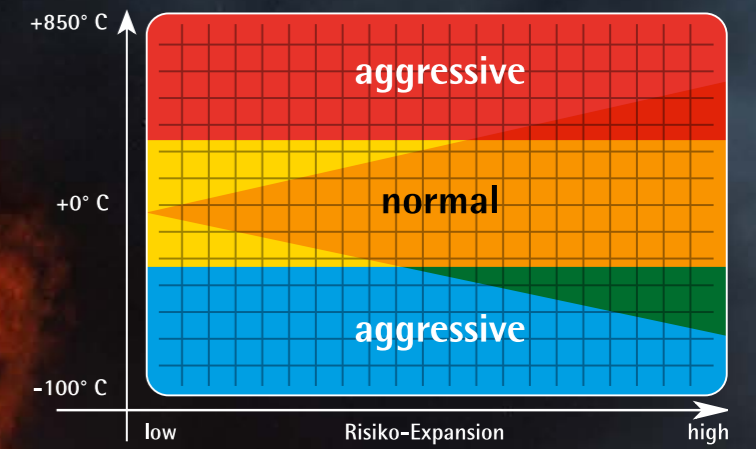
Body activity

Note:

Increase your personal performance by using the right tested functional underwear systems from TESIMAX.

PPE (personal protective equipment) combinations (respiratory protection, functional underwear, helmets, gloves, forced ventilation systems, etc.) are tested and approved for use with TESIMAX protective suits (see user manual).

For further information please enquire.



PERFORMANCE in hazardous areas

What are Ex (explosion risk) areas?

According to the German ordinances on occupational safety and hazardous substances (BetrSichV and GefStoffV), an explosion risk area – also referred to as ex-area, hazardous area or hazardous location (HazLoc) – is an area in which an hazardous explosive mixture of air and flammable gases, vapours or mists is present either continuously, for long periods or frequently.

What is an explosion risk area?

An explosion risk (or hazardous) area is a place where a potentially explosive atmosphere may occur. A potentially explosive atmosphere exists when a mixture of gases, vapours, mists or dusts combines in such a way that it can ignite under certain conditions.

Classification into equipment groups

Equipment is divided into groups I and II, whereby group I covers underground/deep mining and group II all other applications.

Zone classification

Potentially explosive areas are classified into six zones, the classification being based on the likelihood, likely duration and likely frequency of a hazardous explosive atmosphere occurring. A distinction is made between flammable gases, mists, vapours and flammable dusts.

EN 1149-5: Protective clothing - Electrostatic properties - Part 5: Material performance and design requirements: What does this standard cover?

Antistatic clothing prevents electrostatic charges from creating sparks that can cause a fire or explosion.

The pictogram for this standard is a lightning bolt with the standard designation EN 1149-5 below it.

The standard specifies the requirements for electrically conductive protective clothing. This protective clothing is part of a fully earthed system (e.g. in combination with conductive footwear: see FIREMAN SA/BF and TESIMAX FR Safe/Shield clothing and socks) and prevents sparks and thus explosions. Clothing that complies with this standard should always also comply with the standard for flame-retardant clothing (EN 531 or ISO 11612). Areas of application are places where there is a risk of explosion and therefore fire. Protective clothing that complies with the EN 1149-5 standard is often used in companies that have to comply with the ATEX directive.

TESIMAX chemical protective clothing complies with the requirements of EN 1149-5.

The TESIMAX ANGEL SENSOR SYSTEM complies with the ATEX directive. Contact us for further details.

		POLY-RAN-L/S/SUPERLIGHT	Duoform Tessaform CHEMBA	SYKAN 1/2/4	SILVERFLASH
Zone 0	An area in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapour or mist is present continuously or for long periods.	✓	✓	✓	✓
Zone 1	An area in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapour or mist is likely to occur under normal operating conditions.	✓	✓	✓	✓
Zone 2	An area in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapour or mist could occur under abnormal conditions and is not likely to occur under normal operating conditions.	✓	✓	✓	✓
Zone 20	An area in which an ignitable concentration of dust is present in the air continuously, for long periods or frequently.	✓	✓	✓	✓
Zone 21	An area in which an ignitable concentration of dust in the air is likely to occur occasionally under normal operating conditions.	✓	✓	✓	✓
Zone 22	An area in which an ignitable concentration of dust in the air may occur for brief periods and is not likely to occur under normal operating conditions.	✓	✓	✓	✓

The Ex (explosion risk) zone classification tests were carried out at 23 °C and 30% relative humidity (inside and outside). For an optimal result (for the reusable protective suits), we use TESIMAX static inhibitor. This is applied to the protective suits at the factory (5-year storage capability with SMART STOCK packaging). The protective suit made of SILVERFLASH fabric is permanently conductive due to its chemical barrier outer layer (colour: silver metallic).

Note that only the clothing fabric is dissipative. Work in explosion risk zones: In your risk assessment, take into account that the integrated socks can have an insulating effect. It may therefore not be possible to earth the protective suit and wearer via the footwear, so that other measures must be taken to earth the suit and wearer. We recommend TESIMAX Safe/Shield or THERMO-FLEECE functional wear and socks treated with static inhibitor.

To avoid sparks generation, make sure that protective clothing and wearer are properly earthed. Note: Work and (TESIMAX) protective clothing must not be changed in explosion risk areas, i.e. donned and doffed, if there is a risk of minimum ignition spark energy.



TESIMAX protective suits - model overview and Performance characteristics

- = not suitable
 • = suitable
 •• = very suitable
 ••• = ideal

*Respiratory Protection:
 SCBA = self-contained breathing apparatus
 F = filter
 O = no optional respiratory protection or integrated (VSF 20)

ET = emergency teams

**Solids/aerosols/liquids
 Infective agents
 Radioactive particles
 Spray mist
 See TESIMAX permeation list

*** Gasses
 Known/
 unknown gasses
 See TESIMAX permeation list

****War gasses
 to Finabel 0.7 protocol
 See TESIMAX permeation list

Model	Material	Respiratory protection	Type	Solids**	Aerosols**	Liquids**	Gas-ses***	War gasses****
VS 5	CHEMBA	Inner: PA	Type 1a-ET	•••	•••	•••	•••	-
VS 5	POLYRAN-L/S	Inner: PA	Type 1a	•••	•••	••••	•••	-
VS 5	SYKAN 1	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
VS 5	SYKAN 2	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
VS 5	SYKAN 4	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
VS 20	POLYRAN-L/S	Inner: PA	Type 1a	•••	•••	•••	•••	-
VS 20	SYKAN 2	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
VS 20	SYKAN 4	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
VS 20	SILVERFLASH	Inner: PA	Type 1a-ET	•••	•••	•••	•••	•••
GS 3/GS 3M	POLYRAN-L/S	Outer: PA/F	Type 1b	•••	•••	•••	•••	-
GS 3/GS 3M	SYKAN 1	Outer: PA/F	Type 1b-ET	•••	•••	•••	•••	•••
GS 3/GS 3M	SYKAN 2	Outer: PA/F	Type 1b-ET	•••	•••	•••	•••	•••
GS 3/GS 3M	SYKAN 4	Outer: PA/F	Type 1b-ET	•••	•••	•••	•••	•••
GS 3/GS 3M	SILVERFLASH	Outer: PA/F	Type 1b-ET	•••	•••	•••	•••	•••
VSF 5	SYKAN 2	Inner: O	Type 1c	•••	•••	•••	•••	•••
VSF 20	SYKAN 2	Inner: O	Type 1c	•••	•••	•••	•••	•••
VSF 20	SYKAN 4	Inner: O	Type 1c	•••	•••	•••	•••	•••
VSF 21	POLYRAN-L/S	Inner: F (fan)	Type 3	••	••	••	•	-
VSF 21	SYKAN 2	Inner: F (fan)	Type 3	•••	•••	•••	•	•••
VSF 21 PE-D / T	Duoform/Tessaform	Inner: F (fan)	Type 3	••	••	••	-	-
ESK 3 SYKAN	SYKAN 1	Outer: O/F/PA	Type 3	•••	•••	•••	-	-
ESK 3 P-S	POLYRAN-L/S	Outer: O/F/PA	Type 3	••	••	••	-	-
ESK S5 PE-T	Tessaform	Outer: O/F/PA	Type 3	••	••	••	-	-
ESK S3 PE-T+/++	Tessaform	Outer: O/F/PA	Type 3	••	••	••	-	-
ESK 1PE +/++	Duoform	Outer: O/F/PA	Type 3	••	••	••	-	-
ESK 1T+	Puntiform	Outer: O/F/PA	Type 4	•	•	-	-	-
ESK 1 T	SMS 50	Outer: O/F/PA	Type 5-6	•	-	-	-	-

Chemical resistance	Mechanical stress	Flameover	Supercooled media	EX	Maritime use	Weight
•••	(low) single use	•	•	•	•	•••
•	(high) reusable	•	•	•	•	•
•••	(high) reusable	••	••	•	•	•
•••	(high) reusable	••	••	•	•	••
•••	(high) reusable	•••	•••	•	•	•
•	(high) reusable	•	•	•	•	•
•••	(high) reusable	••	••	•	•	••
•••	(high) reusable	•••	•••	•	•	•
•••	(high) reusable	•••	•••	••	•	•
•	(high) reusable	•	•	•	-	••
•••	(high) reusable	••	••	•	-	••
•••	(high) reusable	•••	•••	•	-	••
•	(high) reusable	•	•	•	-	•
•••	(high) reusable	••	••	•	-	••
••	(low) single use	-	-	•	-	•••
•••	(low) single use	••	••	•	•	•
•	(high) reusable	•	•	•	-	•
•••	(high) reusable	•••	•••	•	-	•
•••	(low) single use	-	-	•	-	•••
••	(low) single use	-	-	•	•	•••
•	(low) single use	-	-	•	-	•••
•	(low) single use	-	-	•	-	•••



VS 20 SILVERFLASH



VS 20 series



VS 5 series



VSF 5 series



GS 3 series



VSF 21 series



ESK 3 series



ESK 1 series

Table 0: CHEMICAL PROTECTIVE SUITS – OVERVIEW OF FEATURES

	POLYRAN-L/S/	SYKAN 1	SYKAN 2	SYKAN 4	SILVERFLASH	
Types/series/info						
ESK: Light-duty protective clothing (particle/liquid-tight, according to EN Types 3–6, B) ESK 1, ESK 3 (-> the higher the ESK number, the higher the protection level)	x	x	x	x		
GS 3: Gas-tight protective suit with SCBA outside (gas-tight, according to EN 943 type 1b, B (ET))	x		x	x	x	
GS 3 M: As GS 3 but with permanently integrated mask (gas-tight according to EN 943 type 1b, B (ET))	x	x	x	x	x	
VS 5: Totally encapsulated suits for SCBA (gas-tight, according to EN 943 type 1a, B (ET)) with permanently integrated triple-laminated visor assemblage; 130 cm gas-tight, fused and covered zip	x	x	x	x		
VS 20: Totally encapsulated suits for SCBA (gas-tight, according to EN 943 type 1a, B (ET)) with triple laminated swap visor (for ANGEL SENSOR systems); 180 cm gas-tight, fused and covered zip (easier donning and doffing, Smart Handling)	x	x	x	x	x	
VSF 21: Totally encapsulated suits with forced ventilation (powered filter units, according to EN 943/EN 1073 type 1c/3B)	x					
VSF 5: Totally encapsulated suits with forced ventilation system, steri-filter and flexible air valves, (gas-tight, according to EN 943 Type 1c, B (ET)) with triple laminated swap visor (for ANGEL SENSOR systems); 130 cm gas-tight zip	x		x			
VSF 20: Totally encapsulated suits with forced ventilation system (gas-tight, according to EN 943 type 1c, B (ET)) with triple laminated swap visor (for ANGEL SENSOR systems); 180 cm gas-tight zip (Smart Handling)	x	x	x	x		
Standards & performance data	Where to find further information					
Basic standards	See standards overview in the catalogue					
Performance according to standards/ap- plication	See TESIMAX CPS instruction manual					
Mechanical protection & performance	See TESIMAX CPS instruction manual					
Chemical protection & performance	See TESIMAX CPS instruction manual					
Thermal protection & performance	See TESIMAX CPS instruction manual					
Approvals & Verifications	See TESIMAX CPS approvals & certificates					
User manual	See TESIMAX CPS instruction manual					
Material & equipment	Where to find further information					
Material description and structure, colour:	See product description in catalogue	Yellow/red /NATO olive	Yellow/orange Nato olive	Orange/ Nato olive	Yellow/ Nato olive	Silver
Material and weight	See product description in catalogue	x	x	x	x	x
Material and seam description	See CPS, technical appendix	TOP seam	ULTRA seam	ULTRA seam	ULTRA seam	ULTRA seam
Standard & optional features	See product description in catalogue (stand- ard)	x	x	x	x	x
CPS service life	Note					
Storage period and service life	See catalogue, technical appendix and data (certificates, user manual)	15 years	15 years	15 years	15 years	15 years
Storage period and maintenance, CPS	Without SMART STOCK packaging	1 x per year				
Storage period and maintenance, CPS	With SMART STOCK packaging	5 years maintenance-free				
CPS Service	Note					
PPE and CPS: Service	See service, repair videos, equipment maintenance training courses	See CPS Servicepool leaflet				
PPE and CPS: Training	See Real-time training	See CPS Servicepool leaflet				

Table 1 – TESIMAX CHEMICAL PROTECTION: Standards

	POLYRAN-L/S/	SYKAN 1	SYKAN 2	SYKAN 4	SILVERFLASH
Categorisation by standards	Note				
PPE: Quality Management system (QM)	PASS	PASS	PASS	PASS	PASS
PPE: Basic requirements of CE protective equipment	PASS	PASS	PASS	PASS	PASS
PPE: CPS CE approval (depending on series/ version)	PASS	PASS	PASS	PASS	PASS
PPE: CPS combination/compatibility with other equipment	PASS	PASS	PASS	PASS	PASS
PPE: CPS maritime approval (depending on product)	PASS	PASS	PASS	PASS	PASS
PPE: CPS CE approval only ESK series/ version)	PASS	PASS	PASS	PASS	PASS
PPE: Biological protection (B) - Penetration resistance	PASS	PASS	PASS	PASS	PASS
	Penetration test with artificial blood (ISO/FDIS 11603)	PASS	PASS	PASS	PASS
	Resistance to viruses (ISO/FDIS 16604)	PASS	PASS	PASS	PASS
	Resistance to bacteria (ISO/DIS 22610)	PASS	PASS	PASS	PASS
	Resistance to bio aerosols (ISO/DIS 22611)	PASS	PASS	PASS	PASS
	Resistance to contaminated dust (ISO/DIS 22612)	PASS	PASS	PASS	PASS
	Disinfection/reuse after explosive ordnance contamination, tested by the Robert Koch Institute (Gran PPE study)	PASS	PASS	PASS	PASS
PPE: use against particles, radioactive particle protection	PASS	PASS	PASS	PASS	PASS
	EN 1073-2: Blocking behaviour against r. particles Protective clothing against radioactive contamination - Part 2: Requirements and test methods for non-ventilated protective clothing against particulate radioactive contamination (tested blocking behaviour according to EN 1073-2)				
PPE: use in hazardous areas, antistatic discharge capability	PASS	PASS	PASS	PASS	PASS
	according to EN 1149-5 (in combination with TESIMAX static inhibitor)				
Comparison of EN 943 minimum requirements with other standards worldwide	EN/NATO standard, further standards & individual tests				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to DGUV bgi_guv_i_8671				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to BGR 189-190				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to AMR-14-2 – G26 (BAUA)				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to NFPA (US standard)				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to GOST-R (Russian standard)				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to JIS T8xxx (Japanese standard)				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to ÖBFV En (Austrian EN standard)				
PPE: TESIMAX CHECK* national guidelines	PASS	PASS	PASS	PASS	PASS
	e.g. according to GA-GB (Chinese standard)				
	* The comparison (EN 943, national guidelines and worldwide standards) is based on a manufacturer's assessment.	PASS	PASS	PASS	PASS
Advanced tests: high performance tests	Manufacturers' & national/international standards				
Minimum tensile strength requirements	PASS	PASS	PASS	PASS	PASS
	Boots, swap system gloves, valves (in accordance with EN 943 for safety rope grips x > 1000 N and fixing points x > 250 N)				
Combat gases test: material/seam	PASS (mustard gas)	PASS	PASS	PASS	PASS
	According to Finabel 0.7 C				
Combat gas test: assemblages, closures, components (mask, boot, glove)	PASS (mustard gas)	PASS	PASS	PASS	PASS
	According to Finabel 0.7 C				
Reuse rate after use with mechanical strain	PASS	PASS	PASS	PASS	PASS
	Up to 100%: fully reusable				
Reuse rate after use with chemical contamination	PASS	PASS	PASS	PASS	PASS
	Up to 100%: fully reusable				
Application restriction/recommendation according to EN 943 (DGUV, VFDB)	PASS	PASS	PASS	PASS	PASS
	Unlimited				

Table 2: MECHANICAL PROTECTION – Classification according to EN 943				POLRAN-L/S/	SYKAN 1	SYKAN 2	SYKAN 4	SILVERFLASH
EN standard/approval				EN 943-1	EN 943-2	EN 943-2	EN 943-2	EN 943-2
Mechanical material/seam properties	Minimum level according to EN 943 in conjunction with EN 14325			Mechanical classes				
	EN 943 Part 1 (Industry)	EN 943 Part 2 (Emergency Teams) – limited use	EN 943 Part 2 (Emergency Team) – reusable	Real tested values according to EN 943 – EN 14325				
Abrasion resistance / EN ISO 12947-2	3	4	6	6 (6) *	6 (6) *	6 (6) *	6 (6) *	6 (6) *
Flex cracking resistance / EN ISO 7854	1	1	4	6 (6) *	6 (6) *	6 (6) *	6 (6) *	5 (6) *
Flex cracking resistance at -30 °C / EN ISO 7855 (-30 °C)	2	2	2	6 (6) *	6 (6) *	6 (6) *	6 (6) *	6 (6) *
Tear propagation strength / EN ISO 9073-4	4	3	3	4 (6)	4 (6) *	4 (6) *	5 (6) *	6 (6) *
Tensile strength / EN ISO 13934-1	3	4	6	6 (6)	6 (6) *	6 (6) *	6 (6) *	6 (6) *
Puncture resistance / EN 863	2	2	3	3 (6) *	3 (6) *	3 (6) *	4 (6) *	5 (6) *
Seam strength / EN ISO 13935-2	5	5	5	6 (6) *	6 (6) *	6 (6) *	6 (6) *	6 (6) *
Zip seam strength	3	3	3	6	6	6	6	6
Flame retardance	1	1	3	2	3	3	3	3

*For alternative WIPAN C+ 2026.Superlight, please enquire (observe risk assessment).

Value (value*) = values based on module C 2, each with +/-tolerances due to CIP (*as well as manufacturer's material performance data)

MECH	Abrasion resistance	Flex cracking resistance	Flex cracking resistance at -30 °C	Tear propagation strength	Puncture resistance	Permeation	Ignition	Seam strength	Permeation classes
Class 6	>2000	>50000	>4000	>150 N	>250 N	>480 min.	Passed*	>500 N	>480 min.
Class 5	>1500	>20000	>2000	>100 N	>150 N	>240 min.	-	>300 N	>240 min.
Class 4	>1000	>8000	>1000	>60 N	>100 N	>120 min.	-	>125 N	>120 min.
Class 3	>500	>3000	>500	>40 N	>50 N	>60 min.	-	>75 N	>60 min.
Class 2	>100	>1250	>200	>20 N	>10 N	>30 min.	-	>50 N	>30 min.
Class 1	>10	>500	>100	>10 N	>5 N	>10 min.	Not passed*	>30 N	>10 min.

MECH	Tensile strength
Class 6	>1000
Class 5	>500
Class 4	>250
Class 3	>100
Class 2	>60
Class 1	>30

Table 3a – CHEMICAL PROTECTION – Chemical permeation according to EN 943 – OVERVIEW 2020						
		POLY-RAN-L/S	SYKAN 1	SYKAN 2	SYKAN 4	SILVERFLASH
		EN 943-1	EN 943-2	EN 943-2	EN 943-2	EN 943-2
Chemical resistance	Minimum performance class according to EN 943 in conjunction with EN 14325/ISO 6529		Chemical classes			
	EN 943 minimum requirements	TESIMAX HPE requirements				
EN 943-1 Industry (one test chemical)	At least class 3 (for one test chemical)		Pass*/**	Pass*/**	Pass*/**	Pass*/**
EN 943-2 ET/firefighters (15 test chemicals)	EN 943-1		-	Pass*/**	Pass*/**	Pass*/**

* For further chemical values, see chemical permeation tables for each material (user manual/certificate) and TESIMAX chem. permeation list (over 1000 substances listed, values for the whole suit, TESIMAX materials with maximum values for up to 8 h according to EN 14325. For permeation list, please enquire.)

** SYKAN/SILVERFLASH: Chemical permeation through contamination is effectively stopped already outside the fabric (material/seam with chemical barrier film – REAL REUSABLE)

Table 3b – CHEMICAL PROTECTION – Chemical permeation according to standard EN 943 – MATERIALS 2020								
Hazardous material	SYKAN 1		SYKAN 2		SYKAN 4		SILVERFLASH	
	Material	Seam	Material	Seam	Material	Seam	Material	Seam
Dichloromethane	6	6	6	6	6	6	6	6
Toluene	6	6	6	6	6	6	6	6
n-hexane	6	6	6	6	6	6	6	6
Methanol	6	6	6	6	6	6	6	6
Acetone	6	6	6	6	6	6	6	6
Ethyl acetate	6	6	6	6	6	6	6	6
Acetonitrile	6	6	6	6	6	6	6	6
Tetrahydrofuran	6	6	6	6	6	6	6	6
Diethylamine	6	6	6	6	6	6	6	6
Carbon disulphide	6	6	6	6	6	6	6	6
NaOH sol. 40%	6	6	6	6	6	6	6	6
Sulphuric acid 96%	6	6	6	6	6	6	6	6
Ammonia	6	6	6	6	6	6	6	6
Chlorine	6	6	6	6	6	6	6	6
Hydrogen chloride	6	6	6	6	6	6	6	6

Table 3c: CHEMICAL PROTECTION – Chemical permeation according to standard EN 943 – COMPONENTS 2020

	Visor		GS 3 FACE SEAL in combination with or without an overlapping respiratory mask in accordance with EN 136 Class 3.		Gloves		
	VS 5	VS 20	Without mask	With mask	WIPAN CK-PRO	WIPAN C WIPAN CK	WIPAN B+ WIPAN CK+
Dichloromethane	6	6	1	2	3	2	3 / 6
Toluene	6	6	2	3	6	6	6
n-hexane	6	6	1	2	6	6	6
Methanol	6	6	6	6	6	4	6
Acetone	6	6	6	6	4	1	6
Ethyl acetate	6	6	5	6	2	1	6
Acetonitrile	6	6	6	6	2	2	6
Tetrahydrofuran	6	6	2	3	1	1	6
Diethylamine	6	6	1	2	3	3	6
Carbon disulphide	6	6	1	2	5	6	6
NaOH sol. 40%	6	6	6	6	6	6	6
Sulphuric acid 96%	6	6	6	6	6	6	6
Ammonia	6	6	6	6	6	6	6
Chlorine	6	6	6	6	6	6	6
Hydrogen chloride	6	6	6	6	4	6	6
	Without tear-off visor		The GS 3 must only be used in combination with a suitable mask.		Over- and undergloves for special applications please enquire / P		

P: see permeation list for further information
P2: For the GS 3 M, the permeation values for the fabric/seam joint apply.
P3: For the permeation values for the masks, please enquire with the respective manufacturer or with TESIMAX.

Table 3c: CHEMICAL PROTECTION – Chemical permeation according to standard EN 943 – COMPONENTS 2020

	Boots		Footlets made of suit fabric		Zip (HPE-HPP)		
	HPE-2 (POLYRAN)	HPE-1 (SA/BF) bootleg**/sole**	Suit fabric	Plus boots	Zip without cover	Zip with cover	
Dichloromethane	***	3 / 6	SILVERFLASH and SYKAN models with HPE ULTRA CHEM = Class 6 for all reference chemicals plus boots.		4	6	
Toluene	***	5 / 6			6	6	
n-hexane	4	6 / 6			6	6	
Methanol	***	6 / 6			6	6	
Acetone	***	4 / 6			6	6	
Ethyl acetate	***	6 / 6		For POLYRAN (SUPERLIGHT) and HPE CHEM, the class results from the permeation sum of the material and selected boots according to their properties.		6	6
Acetonitrile	***	5 / 6				6	6
Tetrahydrofuran	***	3 / 6				6	6
Diethylamine	***	5 / 6				6	6
Carbon disulphide	***	3 / 6				4	6
NaOH sol. 40%	6	6 / 6			6	6	
Sulphuric acid 96%	6	6 / 6			6	6	
Ammonia	6	6 / 6			6	6	
Chlorine	6	6 / 6		6	6		
Hydrogen chloride	6	6 / 6		6	6		
	***For further values, please enquire						

** The values for the bootleg have been tested in accordance with EN 943. The figures for the sole assembly (underside) are provided for reference. For further values, please enquire or see the permeation list.

Table 4: CHEMICAL PROTECTION – thermal properties/tests according to standard

Thermal behaviour: Material/seam properties	Min. performance class acc. to EN 943			Thermal classes				
	Class 1 (1 seconds)	Class 2 (3 seconds)	Class 3 (5 seconds)	POLYRAN-L/S	SYKAN 1	SYKAN 2	SYKAN 4	SILVERFLASH
STANDARD TEST REUSABLE CPS – contact heat - Short-term contact at up to approx. 850 °C for >5 seconds with gas tightness test				Class 2	Class 3	Class 3	Class 3	Class 3
STANDARD TEST according to Methods of test - Part 4: Flame test; German and English version (pr)EN 13274-4:2019				Pass	Pass	Pass	Pass	Pass
Thermal behaviour: + 4 h conditioning at approx. -30 °C/+20 °C up to approx. +65 °C (according to EN 943/EN ISO 139)				Pass	Pass	Pass	Pass	Pass
Thermal behaviour: + Contact heat (tested by TESIMAX) – short-term contact at up to approx. 850 °C for > 5 seconds				-	Pass	Pass	Pass	Pass
Thermal behaviour: + Contact heat (tested by TESIMAX) – short-term contact at up to approx. 850 °C for > 10 seconds				-	Pass	Pass	Pass	Pass
Thermal behaviour: + Superheated steam (tested by TESIMAX) – at about 350 °C for up to 30 seconds				-	Pass	Pass	Pass	Pass
Thermal behaviour: + Flashover test approx. 850 °C for 8 s (verified by inspection body)				-	-	-	Pass	Pass
Thermal behaviour: – Protective suit for not less than 4 h at a temperature of -30 ±3 °C (according to EN 943)				Pass	Pass	Pass	Pass	Pass
Thermal behaviour: Material tested by TESIMAX, (climatic test), short-term contact at down to -80 °C verified by inspection body				-	Pass	Pass	Pass	Pass
Thermal behaviour: - Material tested by TESIMAX, (climatic test), short-term contact at -80 to approx. -100 °C (verified by inspection body)				-	-	-	Pass	Pass
Thermal behaviour: - Material tested by TESIMAX (liquid nitrogen), short-term contact at approx. -196 °C for >10 s (verified by inspection body)				-	-	-	Pass	Pass
Protective clothing – Clothing for protection against heat and flame – Minimum performance requirements EN ISO 11612:2015)				-	-	-	-	Pass*

*Performance classes: A1, A2, B1, C3, D3, E3, N.A., W11

Size chart, VS 5/VSF 5/VSF 21 and VS 20/VSF 20 series						
Suit size	Overall height Stretched	Waist Circumference without backpack	Shoulder or sleeve length to gloves	Crotch to shoulder	Boot size Model: see * Standard: 46	Glove size (standard) Model: see Gloves table
S	Approx. 200 cm	Approx. 138 cm	Approx. 79 cm	Approx. 83 cm	43-48	10
M	Approx. 205 cm	Approx. 144 cm	Approx. 81 cm	Approx. 87 cm	43-48	10
L	Approx. 210 cm	Approx. 150 cm	Approx. 83 cm	Approx. 91 cm	43-48	10
XL (standard)	Approx. 215 cm	Approx. 156 cm	Approx. 85 cm	Approx. 95 cm	43-48	10
XXL	Approx. 220 cm	Approx. 162 cm	Approx. 87 cm	Approx. 99 cm	43-48	10

Body size chart/label

Size	Chest measurement	Height
S	92-98 cm	150-165 cm
M	96-102 cm	160-175 cm
L	100-107 cm	170-185 cm
XL (standard)	105-113 cm	180-190 cm
XXL	110-118 cm	190-200 cm

The following applies to all limited-use protective suits:
For further information on body size, see the respective usage instructions, available on request from TESIMAX.

Size chart, GS 3/GS 3 M series

Suit size	Overall height Stretched	Waist Circumference without backpack	Shoulder or sleeve length to gloves	Crotch to shoulder	Boot size Model: see * Standard: 46	Glove size (standard) Model: see Gloves table
S	Approx. 205 cm	Approx. 105 cm	Approx. 58 cm	Approx. 85 cm	43-48	10
M	Approx. 210 cm	Approx. 110 cm	Approx. 60 cm	Approx. 90 cm	43-48	10
L	Approx. 215 cm	Approx. 115 cm	Approx. 62 cm	Approx. 95 cm	43-48	10
XL (standard)	Approx. 220 cm	Approx. 125 cm	Approx. 65 cm	Approx. 100 cm	43-48	10
XXL	Approx. 225 cm	Approx. 130 cm	Approx. 68 cm	Approx. 105 cm	43-48	10

Body size chart/label

Size	Chest measurement	Height
S	92-98 cm	150-165 cm
M	96-102 cm	160-175 cm
L	100-107 cm	170-185 cm
XL (standard)	105-113 cm	180-190 cm
XXL	110-118 cm	190-200 cm

GLOVE MODEL (5-finger protective gloves)	Size	Protective suit	Material
Limited-use protective suits			
NEO NBC elastomer protective glove	7-11 (depending on size)	ESK 1 PE-D+ and VSF 21 PE-D	Duoform
NEO NBC elastomer protective glove	7-11 (depending on size)	S3 PE+	Tessaform
NBC barrier protective glove (over- and undergloves recommended, optional)	7-11 (depending on size)	S3 PE++, S5 PE-T and VSF 21 PE-T	Tessaform
Reusable protective suits (Real Reusable)			
5-finger protective glove MECH-BLUE 351	8-10	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	POLYRAN-L/-S
WIPAN B+ system: CBRN protective glove (IIR) in combination with integrated chemical protection barrier (HPP)/BW underglove	7-11	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH/CHEMBA
WIPAN C system: CBRN protective gloves (HPE elastomer with triple protection) and integrated liner, with replacement system	9-10	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
WIPAN C+ system: SUPERLIGHT NBC protective gloves (nitrile) in combination with integrated chemical protection barrier (HPP)	7-11	VS 5, VS 20, VSF 5-20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
WIPAN CK system: CBRN protective gloves (HPE elastomer with triple protection) and integrated liner, reinforced with para-aramid	9-10	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
WIPAN CK+ system: CBRN protective gloves (IIR) in combination with integrated chemical protection barrier (HPP) and integrated liner, reinforced with para-aramid	7-11	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
WIPAN CK-PRO system: CBRN protective gloves and integrated liner, reinforced with para-aramid	8-11	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
OVERGLOVES (optional)			
MECH BLUE 351 overgloves (mechanical protection, short cuff)	8-10	All	All
MECH BLACK overglove (mechanical protection, long cuff, own production)	12	All	All
Butoflex 651 overglove (chemical and mechanical CBRN protection, long cuff)	12	All	All
MECH SILVER overglove (mechanical protection, long cuff, own production)	12	All	All
Overglove 1000 V (electrical insulation protection, long cuff)	7-11	All	All
UNDERGLOVES (optional)			
Underglove ESD (for optimisation of electrical discharge, arc fault protection, for all CPS)	7-11	All	All
Underglove cotton (for ESK series and WIPAN B+ protective glove system)	6-11	All	All
PROTECTIVE BOOTS			
Standard: HPE-1 Fireman SA BF (colour: black), recommended for SYKAN 1, 2 and 4 and SILVERFLASH models (reusable protective suits)	39-49	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	SYKAN/SILVERFLASH
Standard: HPE-2 Jobguard (colour: black) – recommended for models made from POLYRAN and for limited-use protective suits	39-49	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	POLYRAN-L/-S
Alternatively: HPE-4 DUNLOP® HAZGUARD® safety boots (colour: green)	39-49	VS 5, VS 20, VSF 5/20, GS 3 (M), VSF 21	POLYRAN-L/-S