

## A hand in a dark blue shirt points towards a large, semi-transparent square icon containing the text 'P&amp;A' in blue. Surrounding this central icon are several other semi-transparent square icons, each containing a different safety hazard symbol: a lightning bolt, a chemical flask with a flame, a fire flame, a person slipping, a gear, a snowflake, an umbrella with rain, a person running from a fire, a person lifting a box incorrectly, a person using a power tool, a person using a forklift, and a person using a chainsaw. The background is a solid light blue.



The team of the Certification Department for protective textiles at STFI has been operating successfully on the market since 1994 and supports customers from all over the world with its expertise in testing and assessment of protective clothing. In mid-2017, the Certification Department was notified by the Central Office of the Federal States for Safety Technology (ZLS) to certify personal protective equipment (PPE) within the scope of Regulation (EU) 2016/425.

CE 0516

As Notified Body 0516, the STFI certifies the essential types of textile protective equipment and is also a reliable and competent contact person for material suppliers at all times. The Certification Department is member of the European exchange of experience between the notified bodies.



### The accreditation for type examinations includes:

- Protective clothing for workers exposed to heat (EN ISO 11612)
- Protective clothing for use in welding and allied processes (EN ISO 11611)
- Protective clothing with limited flame spread behaviour (EN ISO 14116)
- Protective clothing against thermal risks of an electrical arc (EN 61482-Serie)
- Protective clothing for fire fighters (EN 469, EN 15614, EN ISO 15384)
- Fire hoods for fire fighters (EN 13911)
- Protective clothing for work in the kneeling position (EN 14404)
- Warning clothing - high visibility for high risks (EN ISO 20471)
- Warning clothing - enhanced visibility for medium risks (EN 17353)
- Protective clothing for rescue service personnel (DGUV-R 105-003)
- Protective clothing against rain (EN ISO 24232)
- Protective clothing against cool environments (EN 14058)
- Protective clothing against cold (EN 342)
- Chemical protective clothing; Type 3, 4, 5, 6 (EN 14605, EN ISO 13982-1, EN 13034)
- Protective clothing against radioactive contamination (EN 1073-2)
- Protective clothing against pesticides (DIN 32781)
- Protective clothing against ultraviolet rays from the sun (EN 13758)
- Protective clothing with electrostatic properties (EN 1149-Serie)
- Protective clothing for use where there is a risk of entanglement with moving parts (EN 510)
- Workwear for use in food business (DIN 10524)
- Workwear for use in EPA (IEC 61340-4-9, IEC 61340-5-1)
- Protective gloves against mechanical and thermal risks (EN 388, EN 407)
- Protective gloves against chemicals and micro-organisms (EN 374)
- Protective gloves for fire fighters (EN 659)
- Protective gloves for welders (EN 12477)
- Protective gloves with electrostatic properties (EN 16350)



## Certification of Protective Clothing – Service for the Industry

The versatile properties of protective textiles can be best described with the word "fascinating". And every day countless people use these multifunctional properties, often without even being directly aware of the performance of the textile fabrics that surround them.

But on the way to the end user, starting with the selection of the right fibre blend, through the various forms of fabric construction and finishing, from design, size fitting and manufacturing on the garment makers' side up to the test laboratories and ultimately also the Notified Bodies, many people have a share on making these high-tech textile products available on the market. Some may even be surprised that the CE-marking of PPE it has been a legal requirement in Europe at latest since July 1, 1995. Before, the manufacturer's promise of adequate protection against non-minimal risks have to be subjected to a comprehensive examination and assessment by one of the independently working Notified Bodies. Naturally, the requirements to be taken into account in accordance with PPE Regulation (EU) 2016/425 go well beyond the requirements of the old directive.

Since that time and also thanks to you - our customers - we have been able to experience but also to help shape by ourselves a lot of the "fascination of protective textiles" on a regular basis. On the following pages, we would like to bring you closer to a small selection from our area of activity outlined on the opposite page...

A handwritten signature in black ink, appearing to read 'Hendrik Beier'.

Dipl.-Inform. Hendrik Beier  
Manager Certification Department PPE



## Protective clothing against heat and flames



Who doesn't like the crackling flames of a campfire on the beach or the warmth of a fireplace in the apartment on cold days? But just as present to us are the images of the life-threatening and destructive forces of a house or wildland fire, in which the flames destroy everything in their way and the enormous heat even melt electrical towers made of steel...

This is one of the reasons why protection against the thermal hazards of flames, heat radiation or hot metal splashes has been one of the most frequently requested functions of protective clothing for years. Many manufacturers even see this as the most prestigious discipline of textile protection. Because, it is most-challenging to provide optimal protection against heat, flames and molten metals in a garment that is equally as light as possible and comfortable to wear. This requirement, which is apparently difficult to reach, is a legal requirement throughout the European Union since the introduction of the directives and regulations for placing PPE on the market. Therefore, every day millions of employees can rely on the functionality of flame-retardant high-tech fabrics which offer in an emergency protection against severe skin burns.

In accordance with the harmonized requirement standards, the Certification Department at STFI, together with the accredited testing laboratory, offers its customers under the one roof a comprehensive and competent examination and assessment of protective clothing in accordance with **EN ISO 11612**. Starting with the significantly increased demands on the burning behaviour of the textile materials and all other findings on the garment such as fasteners, reflective materials, emblems and logos (code A), to the heat transfer in the case of convective (code B) or radiant heat (code C), direct contact with 250°C hot surfaces (Code F) up to the point of being poured with molten Aluminium (Code D) or 1.400°C hot iron (Code E), the entire protective clothing is subjected to a comprehensive test and professional assessment. Not just for this, the decades of active participation in national and international standards as an integral part of our work as well as proof of competence of our certification officers are beneficial.





used in welding protective clothing, from dark grey to fluorescent yellow.

## Protective clothing against the thermal risk of an electrical arc



An electric arc fault during the work on or nearby electrical installations under live working conditions is one of the most tremendous incidents for electricians. Within milliseconds and depending on the installation conditions it causes the formation of a fireball with enormous thermal risks by flames, heat radiation and molten hot particles from the destroyed installation. Here arc-tested protective equipment (PSAgS) can help to survive.

For more than 20 years, our team has been working on the development of test and assessment methods for these risks. Relatively unknown at the beginning of the work, our engagement about this specific form of heat and flame protection not only contributed to answering questions from the risk assessment of related workplaces that could not been answered before. Over the time, STFI has also developed into a Centre of Excellence for testing and certification of protective clothing against the thermal risk of an electrical arc. Starting with the development of the Box-Test according to EN 61482-1-2 up to the world's first harmonized requirements standard **EN 61482-2** this work is strongly connected with the STFI. But only the consideration of all relevant fabric and garment parameters leads to a safe arc protective clothing.

Thus, today each revision of the different arc protection standards and any new development of suitable methods in the several committees of IEC/TC 78 bear our signature. Together with our partners we can help to make work on and nearby electrical installations safer.

This also applies to the increasing number of questions and discussions regarding Arc flash protective clothing in the context of eMobility or for work on electrical systems for the installation and maintenance of high-performance battery storage systems from photovoltaic and wind power plants in connection with the steady growth of renewable energies.



## Protective clothing for use in welding and allied processes



Even for the complete testing and assessment of the textile protection during welding and related processes in accordance with **EN ISO 11611** the clothing only has to move a few steps between our various laboratories and the desks of the Certification Officers. With flame-retardant performances as fundamental characteristic it is intended to protect the wearer against welding droplets, brief contact with flames, radiant heat from an welding arc and to a limited extent even in the event of unintentional contact with electrical conductors with a DC voltage of up to approximately 100 V. And also STFI's Department for the Development of Test Procedures established a significant contribution to the new state of the art from 2025 onwards: The method developed for testing protective textiles using a dual-beam spectrometer with a filter cascade in the wavelength range (200–400) nm provides reliable data on harmful UV transmission for all types of fabric

## Protective clothing with limited flame spread behavior

Even if this clothing on its own probably fulfils just partial requirements from a risk assessment it can play an important role in an entire thermal protective clothing system. The strong demands on the flame-retardant performance in accordance with **EN ISO 14116** and in combination with a heat, flame, welding or arc protective clothing worn above, garment systems with such possible shirts, undershirts or sweater offer remarkable benefit regarding wearing comfort. A bonus for the user.



## Warning clothing – high visibility for high risks



Anyone who has ever experienced the scare of a near accident on a country road in the twilight will highly appreciate the timely recognition and conspicuity of objects suddenly appearing in traffic. However, what will naturally not work with a deer or boar should become a matter of course for active or passive road users participating in the traffic – Safety by visibility! Where a legislative authority or accident insurance company prescribe the use of high visibility warning clothing the harmonised standard **EN ISO 20471** defines the requirements for fluorescent and retroreflective materials and the design of waistcoats, jackets and trousers. With regard to the risk assessment high visibility warning clothing defines three garment classes. The end user has to select the right class in accordance to the requirements either by wearing a single garment or he decides for an entire clothing combination of e.g. jacket and trousers. The strong requirements of the standard for color

and luminance factor of the fluorescent material when new, after artificial aging through sunlight and several care cycles helps to guarantee the protective function in the same manner as all the requirements for the retroreflective strips and the garment design.

## Warning clothing – enhanced visibility for medium risks



However, not every movement in the miscellaneous areas of the public traffic entails high risks and possibly can signalling the user's presence just in daylight conditions may be sufficient. For such products offering increased visibility in medium risk situations the harmonised standard **EN 17353** defines test methods and all requirements to be met. As updated and clearly refreshed product standard of its predecessor published over twenty years ago this standard, just published just in 2020, enables the certification of garment also in the still unusual fluorescent colours yellow-green or pink. In addition it's possible to certify garments in each other colour but with retroreflective strips for conspicuity of the wearer under illumination by vehicles headlights in the dark.

## Protective clothing against rain



A protective function that is relatively often certified in combination with warning clothing could be seen as a typical representative of PPE of Category I and shall therefore not even be subjected to an EU type-examination on its own. But for the combination with a PPE-garment of Category II or III the harmonised standard **EN ISO 24232** defines requirements and test methods for materials and clothing to protect against the influence of precipitation (e.g. rain, snowflakes), fog and ground humidity. Water tightness is the most important property which decisively determines together with the water vapour permeability the performance level and the resulting wearing comfort. The Certification Department uses of course also here the experience and competence of STFI's testing laboratories for all required tests.

## Protective clothing for rescue service personnel

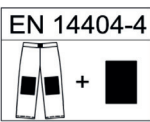
Life is in danger if flashing lights and the horn announces its appearance in the traffic area. But also emergency doctors and paramedics themselves must be adequately protected by their clothing when exercising their responsible activity. In addition to protection against infection by pathogens, especially protection against climatic influences (wind, rain, cold) as well as risks while acting in the traffic area is important. Using **DGUV-R 105-003** "Use of personal protective equipment in the rescue service", a constant and valuable companion for the branch, the STFI tests and certifies protective clothing that meets the requirements for the responsible activities of emergency doctors and paramedics.



Together with the end-users of the various first-aid and emergency organizations, the employers' liability insurance associations and representatives of other testing institutes, the members of the Certification Department for protective textiles at STFI has been developed the basics and technical rules for protective clothing for the rescue service personnel already since the early 2000s. These multi-functional requirements correspond to the possible risks in real life operation. Therefore the fulfilment of the requirement for high visibility by day and night and from all sides according to EN ISO 20471 is just

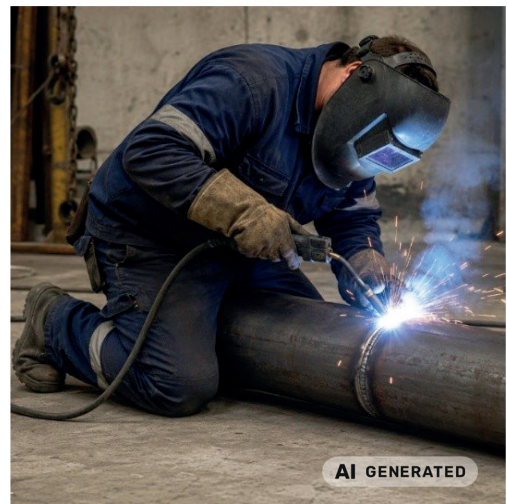
essential as a good protection against the effects of precipitation (rain, snowflakes) according to ISO 24232. And like for other protective clothing too, a professional care is important to guarantee the performance of the garment during use. The ban on washing clothing of rescue service personnel at home to avoid contamination of thirds is just as useful as it is special. Therefore the resistance against disinfecting washing procedures (action areas A and B) according to RKI list is important as well.

## Protective clothing for work in the kneeling position



EN 14404-4 Kneeling, as a common working posture, is unnatural for humans, and the anatomy of the knee is not suited to the prolonged stresses that occur

whilst kneeling. And without special precautions, the potential for effective protection provided by the fabric of welding protective clothing is, of course, limited. The new **EN 14404-4:2024 (Type 2)** therefore provides the opportunity to test and certify interoperable knee pads for use in conjunction with the trousers of welding protective clothing. This high degree of flexibility in terms of different levels of protection against penetration and pressure distribution offers significantly expanded possibilities for providing multifunctional protection to your customers.



## Protective clothing with electrostatic properties



As part of their work, many employees have direct access to potentially explosive or flammable areas, such as those found in petrol stations, refineries, the chemical industry, pharmaceuticals and medical facilities or in paint and solvent processing. This makes it necessary to wear electrostatic dissipative protective clothing. Because if a spark should come over here, it will be dangerous!

Even if the dissipative properties of the main materials are already reliably tested and assessed (EN 1149-3), this does not automatically lead to a technically competent and comprehensive assessment of jacket, parka, trousers or coverall made from it. Here the certification department uses the principles of **EN 1149-5**, which have also been developed in decades of research and standardization work by the STFI experts. Particularly since the last revision there exists a document which allows in principle the assessment of the garment including the often used additional accessories like emblems, logos or reflective applications. Together with the possibility to fully evaluate entire dissipative clothing systems on the instrumented mannequin at STFI's accredited laboratory, a quite rare possibility for an European Notified Body, our customers receive a package full of competence about such areas of application. Thereby STFI is one of the few testing laboratories and Notified Bodies able to offer comprehensive testing and assessment of such protective clothing.



## Protective gloves with electrostatic properties



But jacket, trousers or a coverall can of course not be everywhere and in some areas its mandatory to wear also protective gloves to protect against the existing hazards. Therefore the European standard **EN 16350** defines requirements for protective gloves that are worn in areas in which flammable or explosive atmospheres are present or can exist.

Also this standard was of course developed with the active participation of the STFI experts and defines a test procedure as well as requirements for the performance, labelling and user information of protective gloves with electrostatic properties. Used together with suitable protective clothing in accordance with EN 1149-5, the risk of a man-made generated explosion or ignition can be kept as low as possible.

## Protective clothing against cool environments



Anyone who has their workplace outdoors or other unheated environments appreciates clothing that can effectively resist wind and cold. Especially in the form of fleece or softshell jackets these are best known from various outdoor activities in private leisure time and become, not surprisingly, one of the most popular protective clothing items at moderately low temperatures of over -5 °C. Because thanks to its good insulation properties on colder days a jacket in accordance with **EN 14058** keeps wearer's body heat where it is most needed. Of course always while taking into account the physical condition and activity of the wearer the other clothing used and the environmental conditions.

A real boost of innovation these products received when manufacturers of the soft, flexible and relatively lightweight materials were able to deliver in fluorescent colors and flame-retardant qualities too. It opened-up the door into complex industrial areas which confront workers with



extreme thermal risks like electrical fault arcs in combination with requirements for high visibility together with required protection against wind, moisture and cold. All these can now be realized with fashionable products in a slim-fit design almost feel like a second skin. Not only the normative requirements, but the growing awareness of a best possible wearing comfort in a self-confident design combined with multifunctional protection was obviously exactly the right time for these garments.

## Protective clothing against ultraviolet rays from the sun



The image of a lagoon with turquoise-blue water, white sand with palm trees and a cloudless blue sky with sunshine creates a perfect holiday mood. But since a long time international research studies has shown that prolonged exposure of the skin to ultraviolet (UV) radiation has harmful effects. Therefore an adequate protection against UV radiation is an important pre-emptive measure in view of the increasing number of skin cancers. Especially in consideration of all there outdoor-workplaces it's not surprising that the Guidelines for the PPE Regulation (EU) 2016/425 describes "...garments, including partial or whole body clothing... designed and manufactured to have specific UV-protective properties against natural UV radiation..." as PPE. The UPF (Ultraviolet Protection Factor) is one possibility for testing and classification of the protection effect against solar UV exposure. For this purpose the European standard EN 13758-1 defines the



test procedure for the permeability of UV radiation and the calculation of the sun protection factor. Based on these tests the Certification Department uses the **EN 13758-2** to assess the entire garment properties like fulfilment of the design requirements and labelling. In combination with a PPE also mainly designed for outdoor use like warning clothing and designed to completely cover the upper body from the neck to the hips and the shoulders to at least  $\frac{3}{4}$  of the upper arm a shirt with certified UV protection UPF 40+ will offer a multifunctional protection effect. The same is valid for trousers which shall offer body covering from the waist to below the kneecap.

## Chemical protective clothing



Probably no any other protective clothing in the highest risk category III against irreversible damage to health or even more serious consequences is as varied as chemical protection ones. Especially in the recent past and possibly not without concerns we remember images of first aid workers and rescue personnel in white coveralls in companies and other facilities around the world. But chemical protective clothing in its classic-textile appearance has been standard clothing in many laboratories and research facilities for decades. It seems to be that here the risk to the wearer, which against the clothing shall effectively and reliably protect, affects both the material and the design.

The certification department in the STFI comes mostly in contact with chemical protective clothing in its lowest performance level for protection against accidental splashes of chemicals. This **Type 6** protective clothing in accordance with **EN 13034** is used in rather low-risk areas where the user can take appropriate measures in the event of chemical con-



tamination right in time. They therefore do not need a complete barrier against the permeation of liquid chemicals. So it's by the way not surprising that EN 13034 is often used as an integrated part of a multi-functional protective garment. These all-rounders offer the right textile protection in an appealing design for almost every one of the countless workplaces especially in the complex requirement area of German and European industrial sectors.

## Protective clothing against pesticides



Even if changing shopping habits and the trend towards healthy, sustainable and therefore environmentally friendly nutrition increases the importance of organically produced food, especially the highly-industrial agriculture cannot be imagined without pesticides. The protective suit against pesticides according to **DIN 32781** is intended to avoid risks that can occur when handling (decanting, mixing, diluting) and applying such agents in field and indoor crops as well as greenhouses. Like other chemical protective clothing too, the products have to manage the difficult balancing act between a high and safe barrier to liquid chemicals on the one hand and the best possible wearing comfort with an acceptable water vapor exchange on the other. With regard to these ergonomic aspects, the German standard even goes

well beyond the requirements of European and international standards. With respect to the basic health and safety requirements in Annex II of the PPE Regulation (EU) 2016/425 a clear and relevant advantage is given.



## Safety by training and continuing education

In order to successfully operate in the field of Personal Protective Equipment, information about the content and importance of current harmonized standards is a key success factor. The knowledge about regulations and rules, basic requirements to protective clothing as well as the regularly changing normative requirements for the products, up to essential test methods are equally important for manufacturers and fabric suppliers.

STFI offers training seminars and training courses:

### „Personal Protective Equipment“

EN ISO 11612/EN ISO 14116/EN ISO 11611/EN ISO 20471/EN 17353/EN ISO 24232/  
EN 14058/EN 13034/EN 1149-Serie and IEC 61482-Serie  
(Protective clothing against thermal risks of an electrical arc)



The training course aims at knowledge and know-how transfer in the field of Personal Protective Clothing according to European standards. Besides test methods, special requirements to protective clothing are explained.

Based on harmonised standards, the seminar provides information on practical applications in general and special fields, such as protective clothing against heat and flame, high visibility warning clothing, protective clothing against effects of weather, chemical protective clothing as well as protective clothing with antistatic properties. Comparison of normative requirements and their importance for practical application in working areas will point out interrelations and back-

grounds of several test and assessment characteristics.

Seminars are held in dependence on the content in one-day or multi-day meetings. Participants receive extensive training and documentation. Theoretical training is accomplished in modern equipped meeting facilities and combined with practical demonstrations at plants and in laboratories.

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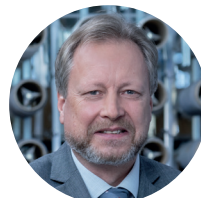
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