

Requirement specifications for flame resistant garments



EN 470-1 Protective garments for use during welding or similar work conditions ISO 11611 Protective garments for use during welding or similar work conditions

In 2007, the latest international standard came for garments and protection for welding. Class 1 is a lower protection level than class 2. Some of the product demand are:

- Design – The garments should cover the torso, arms, legs and neck. No components that can lead electricity from the outside of the garment to the inside are allowed. The design should eliminate that welding sparks are stuck in pockets or seams.
- Durability – seams and fabrics should withstand durability tests and washings according to specific testing methods.
- Flame protection – Strict demands regarding flame spreading, after-glow, debris and burn holes.

The following requirements are new in ISO 11611 and are not in EN 470-1:

- Melted metal – Class 1: *Class 1*: At least 15 drops of melted metal for a temp. increase of 40°C. *Class 2*: At least 25 drops
- Heat transfer (RHTI 24°C, Radiant Heat Transfer Index) – Class 1: at least 7 s, 20kW/m² heat transfer.
Class 2: at least 16 s, 20kW/m² heat transfer.
- Electrical risks – Fabric resistance should be more than 10⁵Ω which is less than 1 mA.



EN 531 - Protective clothing for industrial workers who are exposed to heat ISO 11612 Protective clothing - Clothing for protection against heat and flame

Garments certified to EN 531 give protection in environments where there is a risk of a sudden contact with a small flame. The garments also give protection against heat during limited time and intensity. There are special design requirements for D and E levels.

In 2008 there was a new international flame standard that will replace EN 531. The garments should protect against heat radiation, prevent heat spreading, limit flame spreading and withstand some molten metal and metal spatter. The norm is not for fire fighter equipemnt or welding. Important parameters for ISO 11612-certified products are:

- Design - The garments should cover the torso, arms, legs and neck. No components that can lead electricity from the outside of the garment to the inside are allowed. If the garment is certified for molten meteel (code D or E) yhe design should eliminate that welding sparks are stuck in pockets or seams.
- Durability – seams and fabrics should withstand durability tests and washings according to specific testing methods.
- Flame protection – Code A1 and A2: no edge ignition, no burn holes, no melting, no flames or after glow for more than 2 s. Code A, B and C are manditory, but D, E and F are optional.
- Heat resistance – Is a new requirement in ISO 11612 where components may not ignite or shrink in temperatures up to 180°C.

EN 531	A. Flame protection	B. Heat conductivity (HTI 24)	C. Heat radiation (RHTI 24)	D. Molten Aluminium	E. Molten iron	F. Contact heat
1	X	3 – 6 s	8 – 30 s	100 – 200 g	60 – 120 g	---
2	---	7 – 12 s	31 – 90 s	201 – 350 g	121 – 200 g	---
3	---	13 – 20 s	91 – 150 s	Min 351 g	Min 201 g	---
4	---	21 – 30 s	Min 151 s	---	---	---
5	---	Min 31 s	---	---	---	---

ISO 11612	A. Flame protection	B. Heat conductivity (HTI 24)	C. Heat radiation (RHTI 24)	D. Molten Aluminium	E. Molten iron	F. Contact heat
1	X	4 – 10 s	7 – 20 s	100 – 200 g	60 – 120 g	2 – 10 s
2	X	10 – 20 s	20 – 50 s	200 – 350 g	120 – 200 g	10 – 15 s
3	---	Min 20 s	50 – 95 s	Min 350 g	Min 200 g	Min 15 s
4	---	---	Min 95 s	---	---	---

EN 533 Protective clothing - Protection against heat and flame - Materials and material combinations for limited flame spreading
ISO 14116 Protective clothing against heat and flame - Materials, material combinations and clothing with limited flame spreading
 EN 533 and the replacing norm ISO 14116 is less comprising than EN 531 and ISO 11612 in its requirements. Here is only the ignition and flame spreading of the garment and fabric covered. Index 3 of 1-3 is the highest protection. If high protection agains heat is needed, we recommend certified garments with EN 531 and ISO 11612.

Light arcs cause about 40% of all electrical accidents



Too many accidents happen despite intense efforts to eliminate light-arc occurrences. Light-arc tested central signal boxes and short-tripping time requirements are a step in the right direction towards reducing the number of accidents.

Temperatures in the thousands

Heat in the light-arc can reach several thousand degrees, which quickly increases risk for fire. Clothes that catch fire often cause greater personal injury than light-arcs. So use of protective clothing that does not ignite easily is critical when working near voltage-transmitting facilities.

Light-arc tested protective garments are a must

It is extremely important that all personnel wear light-arc tested, protective garments in environments where light-arcs may occur, for example, when servicing devices in non-secure, light-arc signal boxes. These garments must comply with EBR specifications (June 1997) described below.

Under and outer light-arc tested garments

Under garments made of synthetic fibre cannot resist light-arc heat, even if outer garments do. Garments melt onto the body, which results in severe burns. So it is crucial to dress in light-arc tested garments from the inside and out.

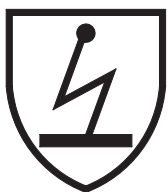
Employees must comply with requirements

Employees must ensure (in collaboration, for example, with safety committees) that professionals who need light-arc tested garments have access to them.

Remember:

- Keep your flame resistant garments clean - dirty garments do not have the same flame resistant effect!
- Only use synthetic detergents. Avoid detergents containing soap, rinsing agents and bleach, which can affect the garments negatively.
- Any repairs must be made with materials that fulfill the garment's level of protection.

Requirements for protective garments against electrical risks



EN 1149 -5 Protective clothing - Electrostatic protection - Part 5:

Requirements on design and containing materials

Part 5 of EN 1149 contains requirements on materials and garment design regarding electrostatic protection. There are specifications regarding surface resistivity of the material, vertical resistance and specific design requirements. If the fabric has woven conducting threads the distance between them must be max 10 mm.

EBR Swedish Electricity Suppliers' requirements for light-arc testing of protective clothing

This is a recommended specification for light-arc testing by the Swedish Electricity Suppliers' members.

EN 61482-1-2 Electrical work - Protective clothing against thermic risks caused by light-arcs

The first European norm regarding protective clothing against light-arcs was published 2008. Testing is made in laboratory environments. Testing can be made according to two security classifications; class 1 responds to 4 kA and class 2 responds to 7 kA, with 400 volts during 500 ms in both cases. The tested garments and materials must not burn for longer than 5 s, melt through or have holes larger than 5 mm.



Shirt

A comfortable antiframe shirt with low weight - only 170 g/m². Complies with the EN 531 norm. Made mainly of modacrylic and cotton, with some kevlar, polyamide and antistatic fibre for increased functionality and durability. Colour: red.

Size: XS - 4XL
CE: EN531-A,B1,C1

OrderNo: 950108425



Flame resistant polo shirt with long sleeves

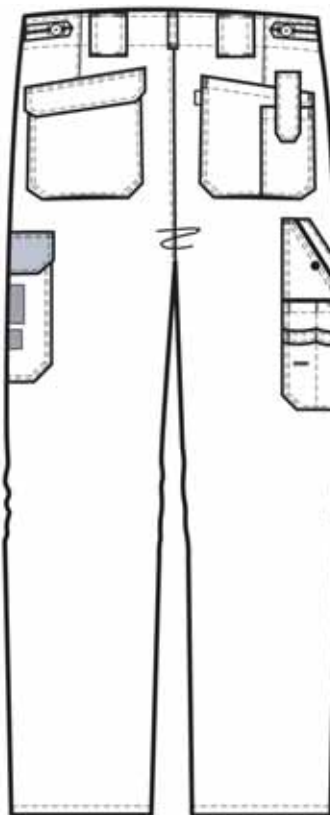
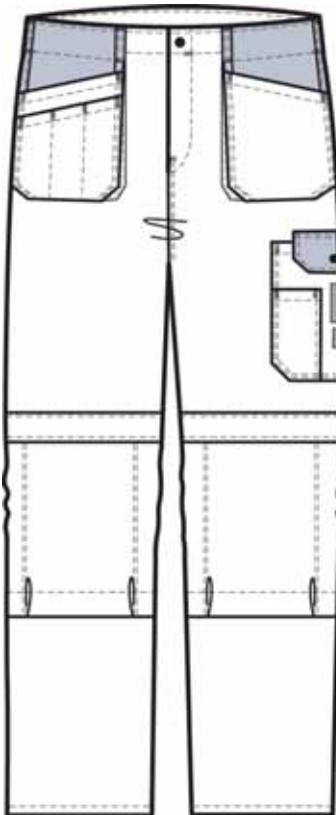
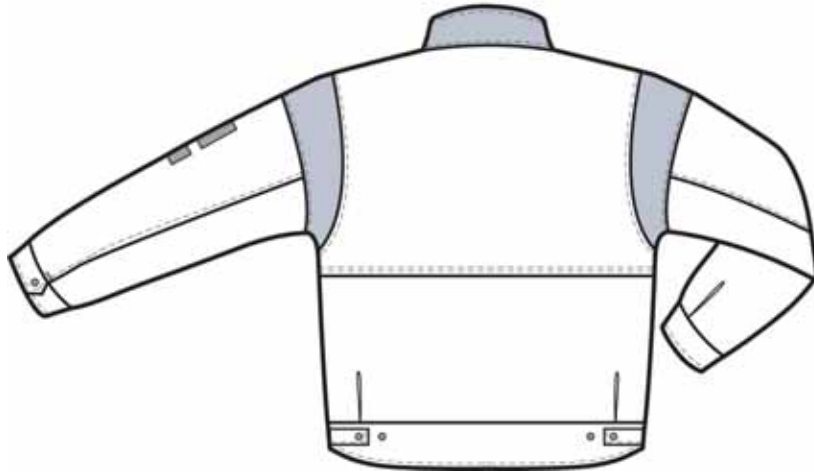
A comfortable poloshirt with long sleeves. Made of 55% modacrylic, which is a flame resistant fibre and 45% cotton. Certified according to EN531 and light-arc tested and approved according to the Swedish EBR norm.

Size: XS - 3XL

OrderNo: 984676



Flame resistant Penta



Fabric description

This fabric isn't treated with flame retardants. Instead, flame resistance is in the fibre. The fabric, which is 49% PPAN FR, 42% cotton, 5% Kevlar, 3% polyamide and 1% Static Control, provides maximum comfort and freedom of movement. Note the fabric's light weight - just 255 g/m² - an unusually low weight for a flame resistant garment.

Our flame resistant garments are spreading like wild-fire throughout Europe. Finland, Norway, Iceland, Denmark, the Netherlands, Germany and the UK have discovered that Björnkälder's flame resistant garments offer the best solutions for safety and economy.

Björnkälder's Penta Anti-Flame garment is suitable for many hazardous situations. With the Penta series, we took flame resistant garments one step further. These garments meet EN 531 requirements for A (flammability), B1 (flame contact), C1 (heat radiation).

They were light-arc tested and comply with EBR requirements.

The fabric was also tested to fulfil EN 533, index 3, EN 1149-3, EN 13034/type 6.

The fabric has excellent antistatic qualities.



Jacket

Jacket, navy/red, with zipper.

Size: S - 2XL
CE: EN531-A,B1,C1. EBR

OrderNo: 775008369



Vest

Vest, navy/red, with toolpockets.

Size: S - 2XL

OrderNo: 461008369

Penta AntiFlame - a very comfortable flame resistant collection with protective function woven into the fabric

For optimum protection against light-arc, we recommend these combinations:

- Trousers + jacket and flame resistant shirt
- Vest + EBR certified shirt + trousers
- Jacket + trousers combined with flame resistant underwear



Trousers

Trousers, navy/red with knee pockets.

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 285008369

Use fitting short knee pads order no.: 972 291 and 972 293!



Tool trousers

Tool trousers, navy/red with toolpockets.

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 209008369



Jacket with buttons

Navy/red

Size: S - 2XL
CE: EN531-A,B1,C1. EBR

OrderNo: 761004769



Vest

Navy/red vest with zipper.

Size: S - 2XL

OrderNo: 461004769



Jacket with zipper

Navy/red

Size: S - 3XL
CE: EN531-A,B1,C1. EBR

OrderNo: 775004769



If you wear our vest with shirt 9508125 or 9508168, you are dressed to comply with EN 531 A, B1, C1 and EBR standards.

Fabric description

A very good flame resistant (Proban) cotton/polyester blend for comfort and mobility. Weight: 335 g/m²

Use fitting short knee pads order no.: 972 291 and 972 293!



Boiler suit

Navy/red. Buttons.

Size: 46 - 60, 148 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 848004769



Vest dungarees

Navy/red. Zipper.

Size: 46 - 60, 100 - 120, 148 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 193004769



EN 531 Protective clothing for industrial workers who are exposed to heat. Garments were light-arc tested and comply with EBR requirements.



Trousers with toolpockets

Navy/red

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 209004769



Trousers

Navy/red

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 285004769



EN 531 Flame resistant garments in cotton/ polyester for people who appreciate comfort and maneuverability

The garments are cut for comfort and ease of movement and have all the pockets you'll ever need. Trousers and boilersuits are equipped with crotch gussets for durability and have dual-level knee pockets for the kneepads. Cell phone pockets are standard in trousers and jackets.

Fabric description
A very good flame resistant (proban) 50% cotton/50% polyester blend for comfort and maneuverability. Weight: 335 g/m²

EN 531 Flame resistant garments in 100% comfy cotton. A collection designed for your safety.

These garments meet EN 531 requirements for A (flammability), B1 (flame contact) and C1 (heat radiation). Garments were light-arc tested and comply with EBR requirements. While all garments in this collection are designed for maximum comfort and movement, this does not affect their protective qualities. They are equipped with all the pockets you need while details, such as the jacket's high protective collar and extended back, make your workday a little easier. The trousers are extra reinforced in spots that wear out quickly, and they are cut for full mobility.



Fabric description

Good, flame resistant (Proban), allround quality in 100% cotton for industrial use. The fabric breathes and features minimal shrinkage and good durability - plus it is bad at generating static charges (which is good). Weight: 340 g/m².



Trousers

Navy/red

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 285004569

Boiler suit

Navy/red. Buttons.

Size: 46 - 60, 100 - 120, 148 - 156
CE: EN531-A,B1,C1. EN470-1. EBR

OrderNo: 844004569

The boilersuit is approved for EN470-1; and you can use it for welding or similar jobs.

Use fitting short knee pads order no.: 972 291 and 972 293!



Jacket

Navy/red with buttons.

Size: S - 2XL
CE: EN531-A,B1,C1. EBR

OrderNo: 761004569

Fabric description

A very good flame resistant (proban) 50% cotton/50% polyester blend for comfort and maneuverability. Weight: 335 g/m²

Vest dungarees

Navy/red, with zipper.

Size: 46 - 60, 100 - 120, 148 - 156
CE: EN531-A,B1,C1. EBR

OrderNo: 193004569



Use fitting short knee pads order no.: 972 291 and 972 293!



Flame resistant shirt

We are proud of this shirt! Why? Because it offers improved protection and you can remove your jacket when you get warm and still comply with international standards and directives. Wear our tool vest (461 00 47 69) with the shirt and you are dressed to comply with EN 531 (A, B1, C1) and EBR standards. Note that you get the best protection if you use the shirt with any of our flame resistant jackets or boilersuits.

Size: XS - 4XL
CE: EN531-A,B1,C1. EBR

OrderNo: 9508125 Red
9508168 Blue



Jacket

Navy/red. Buttons.

Size: S - 3XL

CE: EN531-A,B1,C1,E2. EN470-1

OrderNo: 769004969

Fabric description

Strong and sturdy flame resistant (Proban) twill - 100% quality cotton, weight 400 g/m². Stronger than the 340 g/m² garments, apart from that, they have the same specifications.

Use fitting short knee pads order no.: 972 291 and 972 293!

Trousers

Navy/red

Size: 46 - 60, 100 - 120, 146 - 156

CE: EN531-A,B1,C1,E2. EN470-1

OrderNo: 288004969



Boilersuit

Navy/red. Strong and sturdy flame resistant (Proban) twill - 100% quality cotton, weight 400 g/m². Buttons.

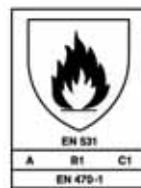
Size: 46 - 60

CE: EN531-A,B1,C1,E2. EN470-1

OrderNo: 846004969



Flame resistant winter



Winter jacket

Flame protected, navy/red

Size: XS - 2XL

CE: EN531-A,B1,C1. EN470-1. EBR

OrderNo: 7564769



Winter trousers

Flame protected, navy/red

Size: S - 2XL

CE: EN531-A,B1,C1. EN470-1. EBR

OrderNo: 224769



100% safety. All-in-one reflecting and flame resistant garments.



Flame resistant security is built into the fabric's blend

Jacket

Flame resistant reflecting jacket, yellow/navy

Size: S - 2XL
CE: EN471-3. EN531-A,B1,C1. EBR

OrderNo: 7718011



Vest dungarees

Flame resistant, reflecting. Yellow/navy.

Size: 46 - 60
CE: EN471-3. EN531-A,B1,C1. EBR

OrderNo: 1768011



Fabric description

A comfortable blend of 55% PPAN FR (modacrylic) and 45% cotton. Weight: 325 g/m². PPAN FR is a flame resistant fibre. Carbon dioxide forms when the fabric is exposed to heat or flames, thus blocking the oxygen supply. Without oxygen, the fabric cannot ignite, even though the cotton is untreated.

CE EN 471
EN 531
A, B1, C1



Flame resistant reflecting vest

Yellow/orange. 100% polyester, 130 g/m². Pocket.

Size: M - 2XL

OrderNo: 308210



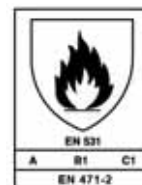
Use fitting short knee pads order no.: 972 291 and 972 293!

Trousers with toolpockets

Flame resistant, reflecting. Yellow/navy.

Size: 46 - 60, 100 - 120, 146 - 156
CE: EN471-2. EN531-A,B1,C1. EBR

OrderNo: 203708011





Reflecting, flame resistant parka

As you can see, this winter garment is for people who work near traffic or high voltage or are exposed to heat. The parka is warm and water- and wind-repellent and has a removable pile liner. The parka's length covers your backside well, and pockets are plentiful and in many different sizes. Flame resistant reflectors. Colour: yellow/navy.

Size: S - 2XL
CE: EN471-3. EN531-A,B1,C1. EBR

OrderNo: 7438011



CE EN 471
class 3
EN 531
A, B1, C1



Reflecting, flame resistant trousers

Björnkkläder's lined trousers have an extended back and snow lock to keep warmth in and snow out. Two front pockets, leg pocket, and closable back pocket ensure that you have everything you need with you. The trousers come with an adjustable waist and belt loops. Flame resistant reflectors. Colour: yellow/navy.

Size: S - 2XL
CE: EN471-2. EN531-A,B1,C1. EBR

OrderNo: 2288011



Hood

Goes with our parka. Classic, tested design with storm flap and protection for chin and neck. Attach it to the parka when wind and cold weather make temperatures unbearable. Colour: yellow/navy.

Size: M - L

OrderNo: 098011

Flame resistance & hi-visibility in the same garment!

Cosy underwear if you need flame resistance close to your body. Function and protection in the same garment

Using approved underwear is at least as important as using the right outerwear. So we designed a totally new collection of underwear to create optimal combinations with our various flame resistant outerwear garments.

Our new underwear is made with 55% Protex-M (modacrylic, a synthetic fibre) and 45% cotton (not flame resistance treated). The combination of Protex-M and cotton helps carry perspiration away from the body, so you feel drier than you would in a garment of 100% cotton.

We create the collection in ribbed tricot fabric. The garments are sewn with flat-lock seams so they don't chafe. The undershirts have raglan sleeves for maximum ease of movement. Our new fabric is not flame resistance treated and complies with EN 531 (A, B1 and C1). It's also approved for use in undergarments according to EBR (IN 033 industry standard for light-arc testing).



Flame resistant short sleeve T-shirt and boxer shorts

Flame resistant underwear, made of Protex-M (modakryl) 55% and cotton 45%.

Size: S - 3XL

OrderNo: 984675 T-shirt, short sleeve
984674 Boxer shorts

CE EN 531
A, B1, C1



Devold flame resistant underwear

Devold underwear is made with 50% wool and 50% viscose. The viscose contains flame resistant fibres. The long underwear have snug fitting knit cuffs at the leg opening; the shirt has snug fitting knit cuffs neckline to increase safety.

Size: S - 2XL

OrderNo: 984567 Long underwear
984568 Long sleeve shirt

CE EN 531
A, B1, C1



Flame resistant long underwear, long sleeve T-shirt

Flame resistant underwear, made of Protex-M (modakryl) 55% and cotton 45%.

Size: S - 3XL

OrderNo: 984673 T-shirt, long sleeve
984672 Long underwear

