

Pyrolon™ Secondary FR Workwear | Heat Tolerances



Operating Temperatures for Pyrolon™ Garments

Pyrolon™ garments combine chemical protection with FR properties. Unlike standard chemical protective clothing they can be worn OVER woven FR thermal protective workwear without compromising thermal protection. You can discover more about this in our [webinar video here](#). But what are the 'heat tolerances' or 'operating temperatures' of Pyrolon™ fabrics and what does this mean ?

Questions about the 'heat tolerance' or 'operating temperature' of Pyrolon™ or other fabrics are commonly asked. Often the question really being asked is: -

"What temperature will the fabric resist?"

The problem with these questions is that they can be misleading and easily misunderstood; what does "resist" or "tolerance" really mean?

Unique fabric that will not burn

Whilst most chemical protective clothing is made from thermoplastic polymers which will ignite and burn, Pyrolon™ garments use a unique fabric engineered for its FR properties. As a result it will not ignite, burn or drip molten debris. And whilst most garment fabrics will soften, melt, degrade or ignite at little over 100°C, Pyrolon™ fabrics will remain intact up to higher temperatures as indicated in the table below.

However, these garments alone are not intended to protect against heat and this does not indicate any level of protection against the temperatures shown, merely that fabric integrity should remain UP TO those temperatures, subject to other factors.

For example: -

- The table below does not suggest a wearer will be protected against the heat from, for example, a splash of liquid at 190°C, even though this is lower than the indicated softening and degradation temperatures. Depending on pressure, volume, proximity to the source and other factors, sufficient heat energy may still transfer to result in a burn.
- On the other hand, nor does it mean a garment will definitely NOT be suitable for such an application. The various factors affecting heat energy transfer might mean that sufficient protection is provided.
- It is not possible to say with certainty that any garment will protect against a heat source at a specific temperature because too many other factors are important.

There is therefore no simple assessment of suitability for any specific application based solely on temperature. We recommend samples are used to test garment suitability (in a safe and non-hazardous manner) and that a decision is then made by a qualified safety professional.

Fabric	Construction	Softening Temperature	Degradation Temperature	Notes
Pyrolon™ Plus 2	Viscose/polyester non-woven	N/A	220°C	Polyester component will melt at 220°C. Viscose component will not melt.
Pyrolon™ XT	Viscose/polyester non-woven, strengthening scrim	N/A	220°C	Polyester component will melt at 220°C. Viscose component will not melt.
Pyrolon™ CRFR	Viscose/polyester non-woven FR PVC film	N/A 200°C	N/A 227°C	Polyester component will melt at 220°C. Viscose component will not melt. PVC film will melt at 227°C.
Pyrolon™ CBFR	Viscose/polyester non-woven FR PVC & proprietary barrier film	N/A 200°C	N/A 227°C	Polyester component will melt at 220°C. Viscose component will not melt. Films will melt at 227°C.

Notes. 1. Degradation of the fabrics will be more rapid at higher temperatures than indicated. 2. The adhesive in the CRFR and CBFR fabrics may soften at less than 100°C but, this should not affect the integrity of the fabric. 3. This table does not indicate any level of **protection** from a heat source at the temperatures indicated. The final decision on suitability of any garment for a specific application is the responsibility of the user.

For more information about secondary FR clothing, FR standards and the principles of heat protection, along with details on Pyrolon™ garments and their uses, download our free [Guide to Secondary FR Workwear](#)

Why Use Pyrolon™ ?

Many applications require **both** thermal protection **and** chemical protection. How do you safely provide both?



Why is wearing standard chemical suits over thermal protective garments a hazard?

How do FR standards EN 14116 and EN 11612 standards differ?

What is Thermal Mannequin Testing and how do different garment types perform?

Why is wearing standard chemical suits over thermal protective garments a hazard?

Currently users often wear a Thermal Protective Garment (TPG) certified to EN 11612 for flame/heat protection and wear a standard chemical suit OVER it for the required liquid or dust protection.

This creates a HAZARD!

Why?

Standard disposable suit fabrics are based on polypropylene/polyethylene and in contact with flames will ignite and burn

Being thermoplastic they melt and drip, adhering to the TPG fabric below, transferring heat energy to the skin beneath and to other surfaces, thus potentially spreading the fire.

In a flash fire situation this will dramatically increase the heat energy contacting the skin and thus the incidence of body burn.

Even in the case of contact with a small flame, a standard chemical suit fabric may ignite and cause burns.

Wearing a standard disposable suit over a TPG can dramatically compromise thermal protection.

How do FR standards EN 14116 and EN 11612 standards differ?



EN 11612 is the standard for measuring PROTECTION against different types of heat; convective, radiant, contact etc

For Flame & Heat Protection a Thermal Protective Garment (TPG) certified to EN 11612 should be worn.

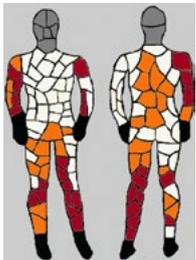


EN 14116 does not indicate any PROTECTION against flames or heat but is to indicate a fabric's flammability - the tendency to ignite and burn in contact with flame.

EN 14116 Index 1 garments can be worn over a TPG without compromising protection.

What is Thermal Mannequin Testing and how do different garment types perform?

Thermal Mannequin Testing provides a method of assessing the effectiveness of heat protective workwear by using a thermal mannequin (a mannequin covered in heat sensors) and simulating flash fires.



This test produces a body map showing Predicted 2nd and 3rd degree burns and so indicates how effectively a garment protects the wearer.

The table indicates how different Type 3 & 4 and Type 5 & 6 suits perform in this test when worn over a Thermal Protective Garment.

Type 3 & 4 overall tests		TPG with Standard Chemical Suit PBB = 53% including 3rd degree burns			
Tests show Pyrolon™ CRFR results in a much lower incidence of body burn than with standard chemical suits.					
Type 5 & 6 overall tests	TPG with FSPE overall PBB = 23.9% including 3rd degree burns	TPG with Standard SMS Coverall PBB = 20.5% including 3rd degree burns	TPG with FR SMS Coverall PBB = 19.6% including 3rd degree burns	TPG with Pyrolon™ XT coverall PBB = 8.2% NO 3rd degree burns	TPG with Pyrolon™ Plus 2 coverall PBB = 7.4% NO 3rd degree burns
Tests show Pyrolon™ Type 5 & 6 coveralls result in a much lower incidence of body burn than with standard chemical suits. Note: there is almost no difference in performance between a standard SMS and an FR SMS. PBB = predicted body burn					

	Pyrolon™ Plus 2	Pyrolon™ XT	Pyrolon™ CRFR	Pyrolon™ CBFR	Pyrolon™ Cool Suit
EN 14116	✓ Index 1	✓ Index 1	✓ Index 1	✓ Index 3	✓ Index 1
Type 6	✓	✓	✓	✓	
Type 5	✓	✓			
EN 1073	✓	✓			
Type 4			✓	✓	✓
Type 3			✓	✓	
EN 11612				✓	
EN 1149-5	✓	✓	✓	✓	✓



Superior Anti-Static Properties
Pyrolon™ garments also feature intrinsic anti-static properties which unlike standard chemical suits do not rub off or erode with time