

In Brief: FR Disposables Guide

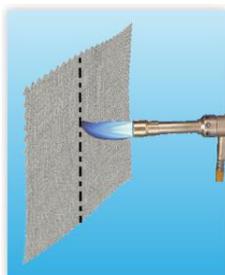
Pyrolon vs. FR SMS

Disposable FR garments are designed to be worn as protective over-garments for Thermal Protective Workwear Unlike standard non-FR disposables they can be worn over heat and flame protective garments *without compromising thermal protection.*

FR disposables meet Index 1 requirements of EN 11416, in other words they should not be worn next to the skin and should not ignite and propagate a flame.

Pyrolon is engineered specifically for its FR properties and is the superior FR disposable. Recent years however have seen a growth in the use of FR treated polypropylene SMS garments – standard SMS fabric with a claimed chemical treatment. These are often cheaper than Pyrolon but more expensive than standard SMS garments.

The key questions however are how does the thermal performance of FR SMS compare with Pyrolon, and do you get what you pay for with FR SMS?



EN14116 : Vertical Flammability Testing

EN 14116 requires vertical flammability testing on a fabric sample with a seam down the centre. This involves applying a small flame to the centre of the sample for 10 seconds. Various requirements must be met as detailed in the first column of the table below.

Lakeland has commissioned independent testing of various FR SMS garment samples purchased from the market. The results are shown below compared with the results for Pyrolon garments. Brand T & M are different major FR SMS brands. Red areas indicate where a sample has failed.

Garment tested	Brand T (1 st)			Brand T (2 nd)			Brand T (3 rd)			Brand M			Pyrolon Plus 2			Pyrolon XT			Pyrolon CRFR		
Test Date	8/8/2012			31/8/2012			12/12/2012			12/12/2012						29/8/2008			8/8/2008		
Specimen	FR SMS Garment Market-sourced Garment Samples									Pyrolon FR garments sample tests											
	1	2	3	1	2	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Flaming to edge?	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	no	no	no	No	No	No	No	No	No
Flaming/molten debris	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No
Afterflame to edge?	No	N/A	N/A	Yes	Yes	Yes	No	Yes	No	No	No	No	No	no	no	no	No	No	No	No	No
Seam Parted?	Yes	Yes	Yes	See note	See Note	Yes	No	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No
Summary	FAIL 2 specimens flaming to edge / all specimens with flaming/molten debris / all seams parted			FAIL On all requirements			FAIL All showed flaming/molten debris / 2 seams parted			FAIL All showed flaming/molten debris / 1 seam parted			Pass*			Pass			Pass		

All 11 specimens from 4 FR SMS samples failed – and failed catastrophically. All failed on the requirement for no flaming debris and several also on other issues.

By contrast all Pyrolon garments have passed all requirements on the first occasion of testing.

So how have FR SMS garments been certified to EN 14116? That's a good question.

It appears from flammability testing however that the best that can be said about the FR properties of FR SMS fabrics however is that at best they are intermittent and at worst they are barely FR at all...

For further information see www.lakeland.com/europe or contact sales-europe@lakeland.com

No Information provided is intended to guarantee product suitability for any specific application: it is always the users financial responsibility to ensure garment suitability

Lakeland Industries Europe Ltd, Unit 2, Jet Park II, Newport, East Yorkshire, UK HU15 2RP

UK Company Registration No: 4500660: For company financial information see www.lakeland.com/financial

Liquid Repellency Testing

Given that FR disposables are used as protective over-garments how do the different garments perform in terms of repellency properties?

Water, alcohol and oil are good indicators of the ability of a disposable fabric to protect the wearer or in this case protect the flame protective garment worn beneath. FR disposables are used commonly on petrochemical plants where this is a vital issue because if an oil or other flammable contaminant penetrates through to the thermal protective garment beneath it can dramatically alter the thermal protective properties.

Lakeland has commissioned independent testing of the repellency properties of different overgarment FR fabrics compared with Pyrolon. The results are shown below:-

Repellency Data : (Highest Score is best)				
		FR SMS Sample1	FR SMS Sample 2	Lakeland Pyrolon Plus 2
Water Spray	WSP 50.1 Test Method	0	85	50
Alcohol Drop	WSP 80.1 Test Method	0	3	7
Oil Repellency	WSP AATCC 118 Test Method	0	0	5

Note: zero represents an immediate penetration through the fabric

Clearly, Pyrolon features a better repellency than the FR SMS fabrics so will better protect the undergarments from harmful contaminants that might seriously compromise the thermal protection provided

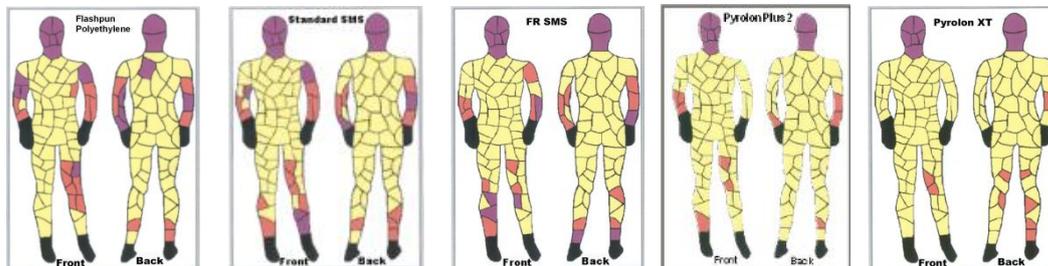
Thermal Mannequin Testing

The key requirement for FR disposables is that they can be worn over an EN11612 Thermal Protective Coverall (such as Lakeland Fyrban[®]) *without compromising total thermal protection*. The acid test for this is a Thermal Mannequin Test (compulsory for North American NFPA but optional in CE) which simulates a 3 or 4 second flash fire over a garment or ensemble and uses a computer to predict total, 2nd and critical 3rd Degree body burn percentage.

Lakeland has commission testing on 5 key disposable garment worn over the same Thermal Protective Garment (in this case Nomex[®]) to allow comparison of Predicted Body Burn The Body Burn maps and results are shown below.



Thermal Mannequin Testing



Garment Ensemble Tested	Standard Disposable Flashspun Polyethylene Over Aramid TPG	Standard SMS Disposable Over Aramid TPG	FR SMS Disposable Over Aramid TPG	Pyrolon Plus 2 Over Aramid TPG	Pyrolon XT Over Aramid TPG
2 nd Degree Burns %	15.7%	13.9%	15.6%	7.4%	8.2%
3 rd Degree Burns %	8.2%	7.7%	4.9%	None	None
Total Predicted Body Burn %	23.9%	20.5%	19.6%	7.4%	8.2%

Note that there is almost *no difference in the total body burn between a standard non-FR SMS and an FR SMS (20.5% vs 19.6%)* Yet the comparative results for *Pyrolon garments are less than half at 7.4% and 8.2%.*

This proves that Pyrolon works... and FR SMS doesn't... so why pay more for FR SMS...?

On the other hand, with Pyrolon you get what you pay for...

For more information and a detailed comparison of FR SMS and Pyrolon download the Guide to FR Disposables at www.lakeland.com/europe

*All Testing has been done by independent accredited laboratories on market-sourced samples

For further information see www.lakeland.com/europe or contact sales-europe@lakeland.com

No Information provided is intended to guarantee product suitability for any specific application: it is always the users financial responsibility to ensure garment suitability

Lakeland Industries Europe Ltd, Unit 2, Jet Park II, Newport, East Yorkshire, UK HU15 2RP

UK Company Registration No: 4500660: For company financial information see www.lakeland.com/financial