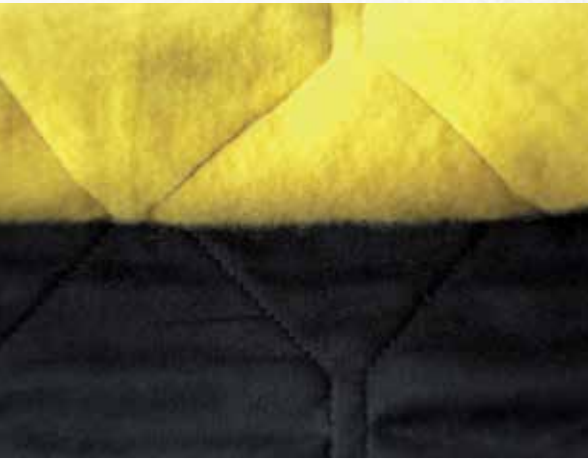


## Protective Barriers



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**Norafin's engineered materials offer enhanced safety to a wide range of industry professionals, help protect fire fighters and make dangerous workplaces less threatening.**

## End-Uses

- FR Insulation
- FR Liners, Moisture Barriers, Thermal Liners
- Norafin Komanda®
  - outershell materials
  - inner liners

## Performance Characteristics

- Lightweight FR material
- Protection against heat and flame
- Superior breathability
- Soft and drapeable fabric
- Improved insulation

## Product Options

- Norafin 3D Performance® leading to improved insulation and comfort
- Multi-layered for side-to-side, and gradient functionalities
- Quilted, stitched and colored materials
- Spunlaced and needlepunched product options

## Fiber Choices

Viscose FR, meta and para-aramids, high-density polyethylene HDPE, polybenzimidazole, phenolic fibers, oxidized polyacrylonitrile, melamine fibers, others

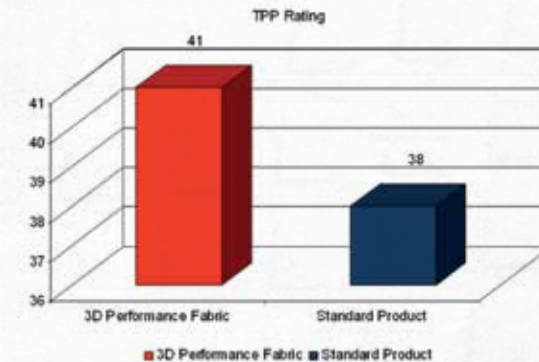
## Aftertreatment Options

Water repellency, oil repellency, high visibility, ...

## Testing & Quality Assurance

In-house material tests according to standard nonwoven norms as well as EN367, EN 6942, EN 15025 I - II as well as the Martindale test method and EN 9237 or EN 20811

When looking into firefighting, the moisture barrier and thermal liner account for up to 70-75 % of the protective gear's thermal protection performance. Thanks to the proprietary texture and surface of the spunlaced nonwoven adopted within the fabric, the product provides a 10-12 % higher TPP rating compared to other competitive materials in the market.



The use of innovative spunlaced materials as an insulation layer not only improves the TPP rating, but also enables a reduction of layers needed to protect against the flames. Thanks to the superior uniformity of the nonwoven web adopted as well as its proprietary surface and texture, the overall weight of the final garment can be reduced leading to improved comfort.

Outershell	Moisture barrier/ thermal liner	Inner layer	Total Weight [gsm]	TPP rating [2 cal/cm <sup>2</sup> ]
PBI + Para-aramid	Spacer material + PTFE membrane	Aramide blend	580	23.3
PBI + Para-aramid	Norafin Spunlace + PTFE membrane	Aramide blend	580	26.9
PBI + Para-aramid	Norafin Spunlace + PTFE membrane	Aramide blend	500	22.9

**Graphic: The higher the garment TPP rating, the more time is required before a second degree burn will occur. As can be seen from the table above the outershell and inner layer was the same for all three compositions. Therefore, by replacing the middle layer with a spunlace material, it is possible to achieve an equivalent (or better) TTP rating or a reduction of the total weight by 15 % respectively.**