



PBI MATRIX™ VS MILLENIA™

THE ULTIMATE IN OUTER SHELL FABRIC
OUTPERFORMS THE COMPETITION

When you don your gear, you want to know it's going to be there for you and protect you when you need it. Two of the most important characteristics of your gear are thermal protection and durability. The outer shell provides the foundation for overall performance of the gear.



Thermal Protection

A combination of thermal insulation (as measured by tests such as the TPP) and thermal stability (break open resistance as demonstrated by dynamic flame).

Every situation is different and it is impossible to predict what's going to happen. That's why you want an outer shell you can trust. You should demand an outer shell fabric that:

1 - Provides exceptional thermal protection, is

2 - Reliable and

3 - Predictable. PBI Matrix fabric fits the bill and is the only outer shell that meets all three demands. Yes, there are new outer shells that may provide 2 out of 3, but 2 out of 3 won't cut it in fire fighting.

Durability

The ability of a material to stand up to the day-to-day rigors of the job it is intended to do.

The rigors a firefighter's outer shell must endure include: sunlight (UV) exposure, visible light exposure, abrasive surfaces, chemical exposure and laundering. PBI outer shell fabrics have over twenty years of proven field performance. No other fabric matches PBI Matrix for total durability. This is demonstrated in both real life situations and laboratory simulations.

We have put PBI Matrix fabric and one of the competitive outer shell fabrics through rigorous side-by-side testing and simulation to determine just how they stack up against one another. We have found that PBI Matrix fabric remains the undisputed champion for total thermal protection and durability. PBI, proudly protecting firefighters for over 20 years.

Here is our objective evidence...

Thermal Protection

Chart 1 derived from information provided by Toyobo (manufacturers of PBO, also known as Zylon fiber) compares the thermal conductivity of PBI vs. PBO fiber. As shown, PBO fiber conducts heat faster than stainless steel. **Chart 2** confirms that true to form, if the fiber conducts heat, then the composite also will conduct heat. This concludes and validates the low TPP values of composites with Millenia outer shell fabric (see Table). Due to the high thermal conductivity of the PBO fiber, garments with Millenia outer shell get hot quicker and remain hot after the firefighter leaves the fire.

Table

TPP Data		
Composite	Shell Wt (oz.)	TPP
PBI Matrix/Crosstech/Caldura SL	7.5	38
Millenia/Crosstech/Caldura SL	7.9	36

Note: Both PBI Matrix and Millenia have exceptional flame and thermal stability but only PBI Matrix fabric provides the necessary insulative characteristic.

FIG.1: PBI Matrix after flashfire testing
 FIG.2: Millenia after flashfire testing

PBI Matrix vs. Millenia™: UV Resistance

PBI Matrix fabric exposed to UV light retains more strength and mechanical integrity than Millenia fabric exposed to the same UV light source. Strength retention after UV exposure is illustrated in **Chart 3**. This simulation demonstrates that it is not only important where you start, but how you finish.

Fluorescent Lighting

Millenia fabric degrades and loses structural integrity when exposed to ordinary room (office) lighting. **Chart 4** illustrates strength retention for PBI Matrix and Millenia fabrics exposed to fluorescent lighting.

Conclusion

When choosing your outer shell, always make an informed decision. PBI Matrix is the superior outer shell fabric used in the fire service. In side-by-side wear tests, PBI Matrix is the preferred outer shell over Millenia due to comfort (less heat stress) and protection. For more information on departments that have conducted wear tests, contact a PBI representative at info@pbigold.com.

Remember these facts...

- Fact 1:** A fabric is only new once and to truly evaluate a fabric you must look at how it performs throughout its life. The UV exposure charts clearly demonstrate that PBI stands up to UV light better than outer shells containing PBO fiber.
- Fact 2:** Thermal protection is a combination of thermal insulation (as measured by the TPP) and thermal stability (break open resistance). **Don't sacrifice one for the other.**

