

PBI vs Agility and other PBO fabrics

What is PBI and PBO?

While they may sound the same, they are two completely different fibers. PBI and PBO are acronyms for the fiber chemistry each represents: PBI is the trade name for Polybenzimidazole, while PBO is the trade name of Zylon® or Polybenzobisoxazole

What outer shells contain PBI and PBO?

PBI and PBO are used in some of the same applications due to their ability to resist degradation from high heat and flame. One such application is the outer shell fabric of firefighter turnout gear.

PBI FABRICS:

- PBI Max™
- Kombat Flex™
- PBI Matrix™
- Gemini XT™

PBO FABRICS:

- Agility™ (20% PBO)
- Advance Ultra® (20% PBO)
- Millenia™ XT (40% PBO)

Where are they made?

PBI is a fiber made by PBI Performance Products, Inc. in Charlotte, NC.

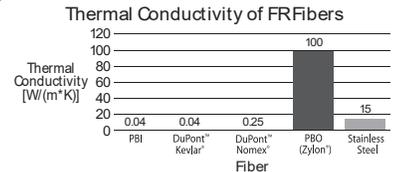


PBO is a fiber made by Toyobo in Osaka, Japan.

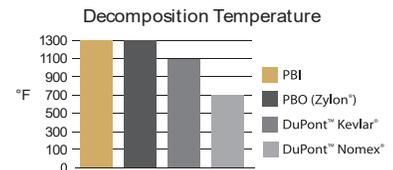


How do they compare in terms of protection?

Thermal Protection – fibers that are highly conductive will increase the rate at which heat is transferred into the gear to the wearer. The chart illustrates the thermal conductivity for various fibers including stainless steel, as a point of reference. PBO® transfers heat through the fiber faster than stainless steel – which is the main reason why PBO fabrics haven't seen traction in the fire service.

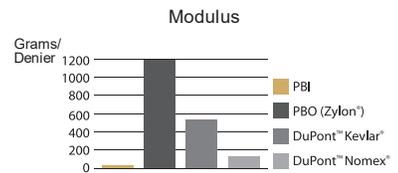


Flame Protection – the ability of a fiber to protect against flame is its resistance to melting, shrinking, and charring. The Decomposition Temperature is the temperature at which the fiber begins to break down. Fibers with higher decomposition temperatures create fabrics with better break open resistance to heat and flame. These higher Decomposition Temperatures help PBI and Zylon® provide superior break open protection.



How do they compare in terms of comfort?

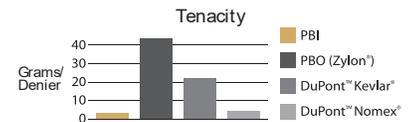
Comfort and flexibility are critical for an outer shell. When fighting fires, the wearer should have the least amount of stress caused by the gear since stress is one of the top causes of line-of-duty deaths. The comfort of a fabric can be related to the modulus and moisture regain of the fiber.



Modulus – is the fiber's resistance to bending. Higher modulus fibers translates into a less flexible fabric. High modulus means a stiff material.

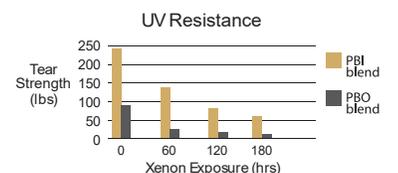
How do they compare in terms of durability?

Durability of the outer shell is usually measured via tear resistance and abrasion. The tenacity of the fiber characterizes strength. Note that the durability of the fabric can be affected by UV light. UV light affects the performance of para-aramids and PBO fibers.



Tenacity – The higher the tenacity, the stronger the fiber. Since PBI is not a strong fiber, it's blended with para-aramids, i.e. Twaron® and DuPont™ Kevlar® to provide strength in the fabric.

An independent study has concluded that PBO's tensile properties decreased more rapidly than those of p-aramid fibers, when exposed to UV.*



Tear Resistance – the industry test commonly used is the trapazoidal tear which measures the pounds of force required to propagate a 1/3 in. tear in a fabric.

PBO Blend – 7.5 oz. 40% PBO /60% Technora®
PBI Blend – 7.0 oz. 35 % PBI / 65% DuPont™ Kevlar® w/ DuPont™ Kevlar® Filament