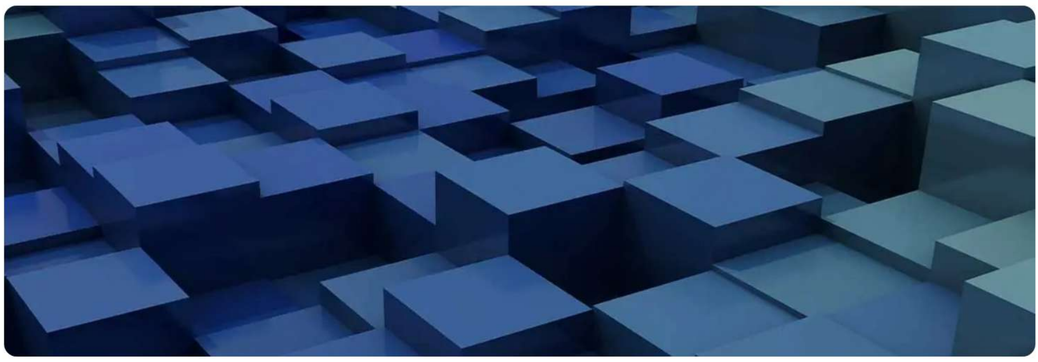
Tuneable Performance



Balancing comfort, durability, and protection in flame resistant uniform fabrics.

At Woven Fabric Company we care for the planet in everything we do. We choose responsible cotton and recycled fibres and low impact dyes. We keep our supply chain close to reduce travel and waste. Our processes use resources carefully and aim for long service life. We make uniforms that respect people and the world they live in.

Abstract

This study compares comfort, durability and flame resistant performance for four fabrics: Blazion Prime 150, Blazion Gaia 150, Blazion Gaia 150HS and a 240 gsm treated cotton benchmark. Tensile and tear strength, air permeability, moisture regain, handle and surface smoothness are evaluated. Findings show Prime leads in strength at low weight, Gaia fabrics improve breathability and comfort through plant based materials, and Gaia 150HS balances comfort with higher strength.

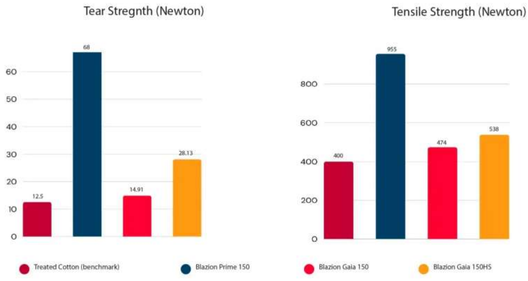
Introduction

The development of flame-resistant uniforms requires a careful balance between durability, comfort, and protection. Each attribute is essential, but the emphasis varies by workplace. A fabric that is strong and durable may feel heavy and uncomfortable, while a fabric that is light and breathable may sacrifice some strength.

This article compares four fabrics side by side: a 240 gsm treated cotton benchmark, Blazion Prime 150, Blazion Gaia 150, and Blazion Gaia 150HS. The analysis draws on laboratory data to understand trade-offs and to demonstrate how different fibres and fabric constructions shape overall performance.

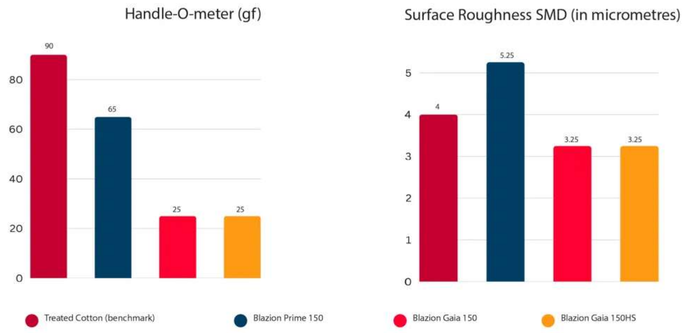
Durability and Strength

Durability is assessed through tear and tensile strength. The benchmark cotton provides a starting point, with a tensile strength of 400 N and a tear strength of 12.5 N at 240 gsm. Blazion Prime 150, at almost forty percent less weight, demonstrates a tensile strength of 955 N and a tear strength of 68 N. This represents a significant improvement in structural integrity. Blazion Gaia 150 records a tensile strength of 474 N and a tear strength of 14.9 N. Blazion Gaia 150HS, engineered for higher strength, performs at 538 N in tensile and 28 N in tear. Both Gaia fabrics therefore surpass the cotton baseline while providing reduced weight and a softer handle. Blazion Prime delivers maximum strength but at the cost of a firmer feel, while Blazion Gaia HS shows a balanced profile.



Comfort and Wearer Experience

Comfort depends on how a fabric interacts with the body during long shifts. Moisture regain, air permeability, handle and surface roughness all contribute to this. The treated cotton absorbs 7 to 8.5 percent moisture, providing moderate comfort, but its low air permeability of 40 l/m2/s makes it feel closed. It also has a high handle value of 90 gf, indicating stiffness. Blazion Prime has lower moisture regain of 4 to 5 percent but significantly higher air permeability at 200 l/m2/s. Its handle is lower at 65 gf, meaning it is easier to flex than cotton, though still firm compared with other options. Blazion Gaia fabrics transform the comfort profile. Both Gaia 150 and Gaia 150HS achieve moisture regain of 12 to 15 percent, which helps absorb perspiration. Air permeability is 250 l/m2/s, ensuring cooler wear. Handle values are 25 gf, showing softness and pliability, while surface roughness is 3.25 µm, smoother than Prime or cotton. The comfort advantage is clear, with Gaia fabrics providing a lighter, cooler and softer experience.



Flame Resistance Performance

Flame resistance is the defining feature of these fabrics. Treated cotton relies on a chemical finish rated for approximately 50 wash cycles, after which performance gradually diminishes. In contrast, Blazion fabrics are constructed using inherent flame-resistant fibres, meaning flame-resistance remains effective throughout the life of the garment. This provides greater reliability in industries where long-term protection is critical. The Gaia range maintains inherent FR performance while prioritising comfort, while the Prime variant combines inherent FR with aramid-based strength for environments where durability is paramount.

The role of Plant based materials

Blazion Gaia fabrics integrate plant-based materials to enhance wearer comfort. These fibres offer higher moisture regain and a smoother hand, reducing heat stress during demanding work. They also introduce renewable content into the fabric composition, supporting sustainability objectives without compromising safety or durability. In practical terms, this allows organisations to supply uniforms that are both protective and responsible, while wearers benefit from improved comfort during long shifts.

Trade offs and options

No single fabric leads in every performance measure. Treated cotton remains familiar and cost-effective, but its protection depends on a surface finish and its structure feels firm. Blazion Prime 150 delivers the highest strength with permanent inherent protection, though its hand remains firmer.Plant-based fibres in Blazion Gaia reduce bending rigidity and lower Handle-O-Meter force, resulting in fabrics that feel less stiff and less coarse. This improves softness, drape, and skin comfort. Gaia 150 is well suited to long shifts and warm conditions where breathability is critical. Gaia 150HS retains this comfort profile while increasing tensile and tear strength for applications requiring both ease and resilience. Prime is best suited to environments demanding maximum durability, while Gaia excels where wearer comfort is the priority.

Conclusion

Uniform fabrics must be selected according to their intended environment. Some workplaces demand maximum durability, others prioritise comfort during long shifts, and many require a balance of both. The data confirms that these needs can be addressed through thoughtful material design. By offering Prime, Gaia, and Gaia HS alongside cotton benchmarks, Woven Fabric Company enables organisations to make informed, evidence-based choices. The result is not compromise, but a spectrum of solutions that can be tuned to protect, endure, and support those who wear them.

Keywords : flame-resistant, comfort, durability, performance, sustainability, tear strength, tensile strength, plant-based fibres