Advantages of DuPont™ Tyvek® IsoClean® Single-Use Controlled Environments Garments and Accessories

DuPont Controlled Environments (CE) garments and accessories, designed for single use, offer meaningful advantages in today's challenging cleanroom environments.

DuPont™ Tyvek® IsoClean® single-use garments provide a more consistent fabric barrier and strength than reusable garments because they are not subjected to multiple cycles of wearing, laundering and sterilization. DuPont CE garments can also help minimize cross-contamination risk because they are clean-processed and packed in a facility that handles only new garments.

One method to sterilize cleanroom garments is exposure to gamma radiation. But this also affects the polymer that makes up the garment. This effect is cumulative, so every time a garment is exposed to gamma radiation, additional changes to the polymer can occur.

The effect of gamma radiation on polyester has been widely studied[1,2] and one typical reaction that occurs is known as chain scission. This means that "breaks" are created in the backbone of the polymer, shortening up the polymer molecule chains (see figure 1). These segments can also recombine and cross-link, linking together different polymer chains. With repeated exposure to gamma radiation, these changes can impact the performance of the polymer and garments.

To aid in your garment decision-making, DuPont is conducting a study to map the properties of polyester reusable garments compared to washing and gamma radiation exposure cycles.

For research, two different types of polyester woven garments typically worn in cleanrooms were purchased. They were laundered and exposed to gamma radiation in consecutive cycles. To expedite the study, the garments were not subjected to wear, only laundering and radiation exposure. The study plan calls for garments to be evaluated after set numbers of cycles. It also provides for testing of critical performance properties at third-party laboratories. Some initial results from this study are shared.

To establish the baseline performance of the reusable polyester garments, properties of the garments were measured "as received," without any laundering or exposure to gamma radiation. Bacterial filtration efficiency (BFE) was measured consistent with method ASTM F2101. These baseline results are shown in Chart 1.

FIGURE 1

Pictorial Description of the Effect of Gamma Radiation on Polymer Molecule Chains

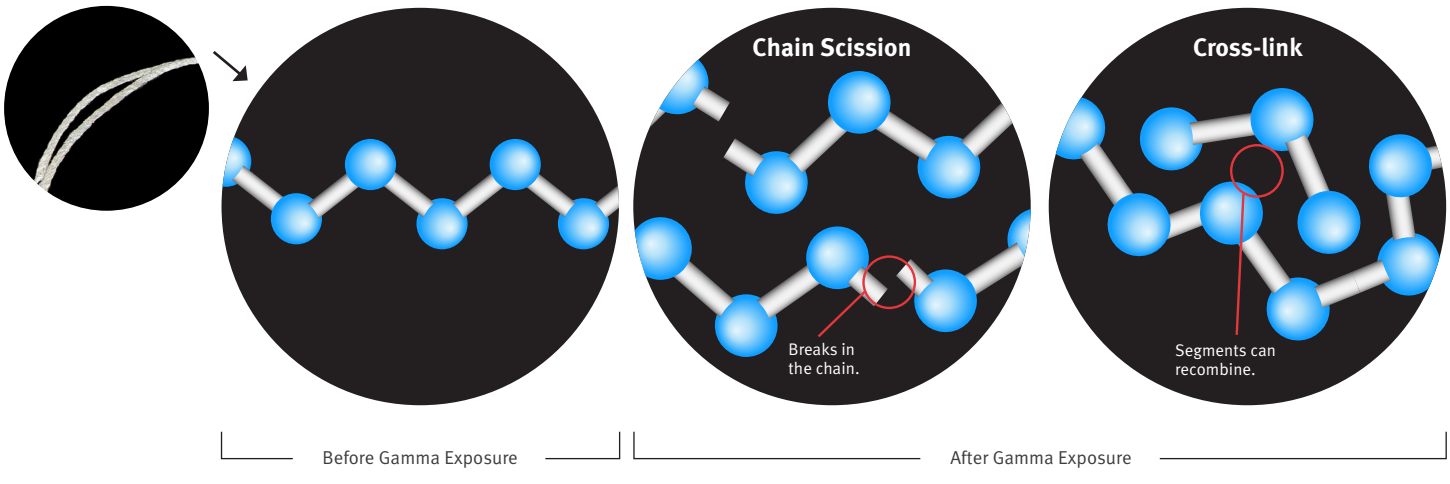
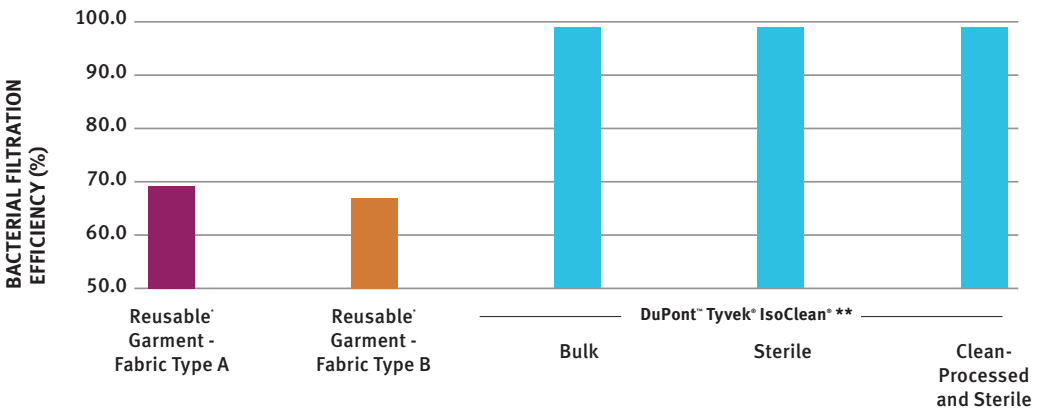


CHART 1

Average Bacterial Filtration Efficiency (%)

Higher numbers indicate better filtration efficiency

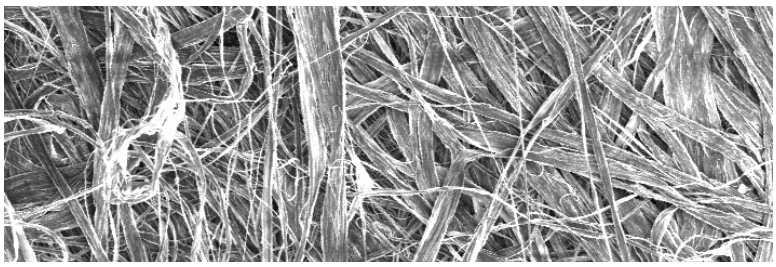


*Results average of 10 measurements per fabric type from "as-received" garments

**Results as reported in SafeSPEC™

For single-use garments, the impact of gamma radiation on the polymer only occurs one time, so the properties are consistent.

DuPont™ Tyvek® delivers an ideal balance of protection, durability and comfort.



DUPONT™ TYVEK® IS MADE WITH A UNIQUE FLASH-SPINNING PROCESS THAT CREATES A TORTUOUS PATH FOR PARTICLES.

IMAGE SHOWN AT 200X MAGNIFICATION.

DUPONT Tyvek. | FOR GREATER GOOD™

DuPont is in the process of completing the tests on reusable garments and on the polymer that makes up the garments. Expect to see more results as the study progresses.

For the most up-to-date information, consult SafeSPEC™ at www.SafeSpec.dupont.co.uk

[1] Potnis, S. P., Shetty, S. M., Rao, K., N., and Prakash, J. "Studies in Effect of Gamma Radiation on Synthetic Fibres – I." *Die Angew. Makromol. Chem.* **6** (1969) 127-135.

[2] Nair, P. D., Sreenivasan, K., and Jayabalan, M. "Multiple Gamma Radiation Sterilization of Polyester Fibres." *Biomaterials,* **9** (1988) 335-338.

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