



Static Electricity

Research shows that flame resistant garments are no more hazardous than any other apparel in hazardous areas where static electricity is a concern.

The generation of static electricity on clothing depends on a number of factors: the relative humidity, the fabrics involved, the use of grounding devices, and the task being performed. Under standard environmental conditions, synthetic fabrics such as polyester or NOMEX absorb less moisture and retain more static than natural fiber fabrics. NOMEX IIIA contains 2% static dissipative fiber to control nuisance static. NOMEX does not require moisture in the atmosphere to conduct static electricity. However, NOMEX garments alone without other engineering controls will not address the hazards associated with static.

Natural fabrics such as cotton used in Bulwark durable flame resistant cotton and cotton blend garments have less static buildup in high humidity conditions because they absorb water from the atmosphere. This water conducts and helps distribute the static charge. However, since absorbed water is actually conducting the charge and not the cotton fiber itself, cotton fabric is ineffective at dissipating static charges at low levels of relative humidity. These garments will dissipate static in high humidity, but not under low humidity conditions.

Static electricity in the workplace can be either a nuisance in the form of garment cling, or a hazard from sparking in a flammable atmosphere. The primary hazard from static charges is the stored energy on the body of an ungrounded person. Most flammable vapor/air mixtures can be ignited with spark energies in the range of 0.15 to 2 millijoules (.001 joule, a unit of electrical energy). The ungrounded human body can store energies as high as 40 millijoules while clothing can hold less than 5% of that amount. The contribution of clothing to static charge buildup is very small as long as wearers do not don or remove items of clothing in a hazardous area.

Donning or removing any garments can generate static charge on the fabric through triboelectric generation by friction and cause charge separation between the layers of clothing. Increased charge on the fabric and charge separation increases the likelihood of spark generation from the fabric surface. Testing of a Bulwark vest showed a 5X increase in static charge to the wearer when the vest was removed compared to the charge present while the vest was being worn. Therefore the action of donning or

removing garments can increase the charge on the human body and provide a source of spark energy.

Proper grounding of the individual is the most important element in a static control program. This can be accomplished indoors with conductive footwear and flooring, or with personnel grounding devices such as conductive wrist straps. Outdoors, personnel can be grounded by touching a grounded object or vehicle in a safe location. "Touch plates" can be installed in doorways to ground personnel before entering hazardous areas.

In summary:

1. Flame resistant garments are no more hazardous than any other apparel fabrics under the same conditions.
2. The primary hazard is stored energy on the body of an ungrounded person.
3. To avoid problems, apply engineering controls to properly ground personnel.
4. Train workers to never don or remove garments in hazardous atmospheres.

Bulwark Protective Apparel