

Personal Protective Equipment

Flame- and Heat-Protective Clothing

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When would flame-resistant and heat-protective clothing be required?

Flame-resistant clothing temporarily protects the worker from serious burns. In the case of a fire, workers should always follow fire safety and evacuation procedures.

When fire hazards are present, flame-resistant or more protective clothing may be worn. This clothing is made of specific fabrics and coatings that can withstand high temperatures and flames. Common materials are treated cotton, Kevlar®, Modacrylic®, and Nomex®.

Clothing worn beneath flame-resistant clothing and against the skin is just as important. These items should be made of fire-resistant fabrics or natural fibres that do not melt. Appropriate natural fibres include wool, silk, and cotton.

- Do not wear synthetic materials such as nylon, polyester, acetate or acrylic fibres. These fabrics are moderately flammable. They will burn. The fabric may melt, causing deep and extensive burns to the skin.
- Do not wear fabrics laminated with polyurethane. Polyurethane ignites and burns quickly.

Other personal protective clothing may also need to match the risk from fire or heat, such as footwear, gloves, etc.

What are some types of flame-resistant or heat-protective clothing?

Specialized protective clothing may be necessary for certain jobs or work conditions, including:

Flame-resistance can be an inherent property of a fabric or material, or it can be achieved using specific treatments.

Heat-resistant (aluminized) suits for extreme situations, such as working around smelters or forges. Aluminized materials are designed to reflect radiant heat and shed molten-metal splatter to keep the wearer cooler and protected. Aluminized suits have various base fabrics that can provide comfort, insulation, or protection from abrasion or puncture resistance.

Bunker (or Turnout) gear is protective clothing for structural firefighting. It consists of a coat and pants with three distinct layers: an outer shell (abrasion and flame resistance), a moisture barrier (waterproof and breathable), and a thermal liner (insulation from heat).

Arc flash suit, which is a complete arc-rated clothing and equipment system that covers the entire body, except the hands and feet, to help protect from shock and arc flash hazards. Specific rated gear is also required to protect the worker's hands, head, face and feet. A typical layering system may include cotton underwear, a shirt, and trousers under an arc-rated coverall.

What are some considerations when selecting protective clothing?

The type of protective equipment chosen will depend on:

- How close the worker is to fire and ignition sources
- The risk of a flash fire
- How quickly the worker can escape the danger zone

Clothing must also be selected for the tasks performed, the hazards associated with those tasks, and the work environment in which they are performed. Important factors include:

- Resistance to chemicals, abrasion, and thermal temperatures
 - Ability to resist the build-up of static charge
 - Ability to act as a barrier to liquids, oils, and dirt
 - Worker comfort (fit, feel, warmth, coolness)
 - How long the clothing will be worn (continuous or intermittent)
 - Frequency of washing and cleaning required to maintain clothing performance
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What should be considered when wearing this clothing?

The clothing should not be tight-fitting. A layer of air between the fabric and the skin will provide additional insulation against heat.

When wearing flame protective clothing:

- Make sure the clothing matches the hazards present, including clothing worn underneath.
- Determine if additional neck, head, hand, or foot protection is needed.
- Inspect before use for wear, damage, or other issues that may reduce the level of protection.
- Wear as instructed by the manufacturer, including the appropriate under- or overgarments.
- Be aware of any limitations or warnings provided by the manufacturer.

Inspect before each use, and after cleaning. Look for:

- Damage to the fabric
- Reinforcements are in place for the outer shell, lining, wind or moisture barrier, hardware, wristlets, etc.

Do not use damaged or contaminated clothing. Tag and remove from service immediately. Determine if the clothing can be repaired according to the manufacturer's instructions, or if it should be destroyed.

What are some tips when cleaning flame-resistant or heat-protective clothing?

To keep the clothing's original properties, follow the manufacturer's instructions when cleaning. This clothing loses its effectiveness if the fabric is dirty or oily. In addition, the build-up of detergent and mineral residues on and in the fabric can reduce the fabric's effectiveness. For example, bleach will destroy the special properties of treated clothing.

Tears or other damage must be repaired right away to keep the clothing's protective qualities. Patches and threads must also be fire-resistant. Follow the manufacturer's instructions.

Some tips include:

- Wash flame-resistant and flame-retardant clothing separately from other clothes.
- Turn the clothing inside out before washing to help protect the reflective material and reduce streaking.

- Use the highest water temperature recommended to remove dirt and grime.
 - Do not use chemical bleach, strong detergents, or fabric softeners, as these products can damage the clothing or affect the flame-resistant coatings.
 - Do not use insect repellents on flame-resistant clothing, as repellents can make the clothing more flammable.
 - Do not use hard water, as the buildup of calcium and magnesium salts can become a fuel source if the clothing catches fire.
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