

March 2008



NFPA 1851 INSTRUCTIONAL PROGRAM

Abbreviated printable version to electronic program

CLEANING MODULE



In this module, you will learn about

- The types of cleaning required
- Potential moisture barrier damage that can occur during washing
- Recommendations for preventing damage to the moisture barrier

This program does not address

- Glove moisture barriers
- Footwear moisture barriers
- CBRN garments

Unless otherwise noted, references to CROSSTECH® moisture barrier in the remaining part of this module refer to all types of products in Gore's moisture barrier product family.

Improper cleaning process can damage the moisture barrier.



This module covers the considerations and impact of cleaning and decontamination on moisture barriers.

Types of Cleaning

- Three types include routine, specialized, and advanced
- Gore does not endorse any specific washing methods or any specific cleaning products
- Improper cleaning can damage gear
- See Section 7 in NFPA 1851–2008 edition



Section 7 in NFPA 1851–2008 edition covers cleaning and decontamination, specifying methods for routine, specialized, and advanced cleaning requirements. Dirt and other contaminants can have a significant impact on the effectiveness of the protective gear and can pose health risks to the emergency personnel. Gore does not endorse *any* specific washing methods or any specific cleaning products for its moisture barriers. You should follow the guidelines provided in NFPA 1851–2008 edition or contact your garment manufacturer. Nevertheless, if not done properly, the cleaning process can damage the moisture barrier.

Routine Cleaning

- Brush off dry debris at emergency scene
- Additional spot cleaning
 - Water less than 105°F
 - Soft bristle brush
 - Dry the garment (Section 7.4)

Specialized Cleaning

Per sections 7.1.4–7.1.6 of NFPA 1851–2008, any element of a protective garment that is known or suspected to be contaminated with a hazardous material, blood, or body fluids must be evaluated at the emergency scene and may require specialized cleaning.



The 2008 edition NFPA 1851 states that routine cleaning begins at the emergency scene, with the emergency response professional brushing off any dry debris, if possible. Your organization should have a dedicated utility sink for use during routine cleaning. Additional spot cleaning requires the following steps: Gently rinse the garment in water that is less than 105°F. If necessary, use a soft bristle brush to wipe away debris. Dry the garment according to Section 7.4 of the standard. If water fails to remove the dirt and debris from any spot of the element, consider whether the element needs an advanced cleaning. **CAUTION:** Never scrub the element vigorously with a brush or use high-velocity water jets such as a power washer.

Only members of the department who are authorized to conduct a preliminary assessment can evaluate the extent of contamination and whether the item should be isolated, tagged, and bagged at the scene.

Advanced Cleaning

- Trained personnel or verified ISP
- Garment manufacturer's guidelines



NFPA 1851 2008 edition requires advanced cleaning to be done by a verified ISP or trained personnel in your organization. Again, Gore does not endorse any specific washing methods or products; however, if not properly done, cleaning procedures can damage a CROSSTECH® moisture barrier. Based on information from garment manufacturers and verified ISPs, you should follow these guidelines to prevent damage to a CROSSTECH® moisture barrier during the cleaning cycle.

Advanced Cleaning Detach Liner System



If possible,

- Detach the liner system
- Turn detachable liner systems inside out
- Close the liner system
- Remove DRD (Section 4.7.3.9.1)



If possible, clean the liner system and the turnout gear separately by detaching the liner system as follows:

Turn a detachable liner system inside out so that the moisture barrier is on the inside for both machine washing and drying.

Close the liner system as much as possible to prevent damage to the moisture barrier.

Also, as stated in Section 4 of the standard, if the coat has a DRD, remove it before washing and drying the liner system in a machine.

Damage due to excessive G-force during spin cycles

- May cause major leaks in the moisture barrier
- May cause thinning of the thermal liner



Whether you decide to purchase a washing machine for your organization or you select an ISP to perform your advanced cleanings, you should check the g-force level of the washing machines. Excessive g-force during the spin cycle of the extractor can cause major leaks in the moisture barrier as well as thinning of the thermal liner. Signs of this damage include black marks on the moisture barrier.

Spin Cycle

- The liner system is thrown against the extractor wall
- The waterproof moisture barrier does not let water escape
- Moisture barrier gets forced into the drum's holes



During the spin cycle, the liner system is thrown against the wall of the extractor drum, which has holes for removing water. A waterproof material, such as a moisture barrier, does not let water escape; therefore, the moisture barrier gets forced into the holes of the extractor drum, which may have small burrs that can cut the moisture barrier.

Water Drainage

Meanwhile, water:

- Needs to drain
- Finds the “path of least resistance”
- Pulls thermal liner insulation
- Causes thin spots and thick spots in insulation



Meanwhile, the water still needs to drain from the drum. Since water does not penetrate the moisture barrier, it finds the “path of least resistance,” which includes the non-sealed seams at the moisture barrier/thermal liner interface, such as the cuffs and hem. As the water is forced past the thermal liner, it pulls insulation with it, thereby causing thin spots in some sections and thick spots closer to where the water exits the liner system.

G-Force Calculation

- Data required:
 - Diameter of drum
 - Maximum RPMs
- Calculators available on Internet
- Result less than 100G



Based on data available to date, the g-force of the washing machine's extractor should not exceed 100g. To determine the G-force, use a standard G-force equation calculation by entering the diameter of the extractor's drum and the maximum RPMs during the spin cycle while washing your gear; you can easily find automatic G-force calculators on the Internet. If the g-force exceeds 100g, contact the extractor manufacturer for instructions on how to decrease the RPMs. Most likely, you will have different programs for your ensemble elements and other laundry items, such as linens or towels.

Other Uses

If the washing machine is used for items other than PPE, clean the machine before washing PPE components by running the empty machine through a complete wash cycle with detergent and the maximum level of water at 120°F–125°F.



Washing machines must be cleaned if used for washing other materials.

When Washing Liners



Wash/Dry Temperatures

Wash and dry temperatures less than 105°F

Detergents

Acceptable pH range — 6.0 through 10.5

Bleaches/Solvents

Get approval from your garment manufacturer before using:

- Active-ingredient agents
- Any type of solvents
- Never use chlorine bleach

Ultraviolet Rays

Not all components of turnout gear have the same level of UV-resistance, so do not dry the components in direct sunlight.



Keep the water temperature in the washing machine and the air temperature in the dryer below 105°F (40°C). Wash and dry temperatures less than 105°F

Only use detergents or cleaning agents that have a pH ranging between 6.0 pH and 10.5 pH. Exposing elements of protective gear to substances that are too acidic or too basic can have adverse effects.

Some solutions must be discussed with your garment manufacturer. Never use chlorine bleach.

Not all components of turnout gear have the same level of UV-resistance, so do not dry the components in direct sunlight.