

Fire Products > Personal Protective Equipment - PPE



Jeffrey O. and Grace G. Stull

PPE Update

How to rid firefighting PPE of bedbugs

Bedbugs can and will get in your turnout gear; the nature of PPE makes eradicating them all the more tricky

Sep 16, 2014

We are routinely asked about problems that firefighters have with unusual forms of contamination for their turnout gear. Other than the commonly reported paint, tar, various hydrocarbons, and other substances, we are seeing a new trend in less-traditional forms of contaminants.

As strange as it may seem, gear can be contaminated by bedbugs — sometimes because of poor storage practices or simply from firefighter clothing contact in areas where infestations have occurred. And as some may know, bedbugs can be difficult to get rid of, particularly if cleaning options are limited.

However, these are not the only bugs that the fire service has to worry about. Given the routine contact with the public, firefighter PPE is being exposed to different microorganisms, some of which can be quite infectious and lead to serious health problems.

For example, over the past several years, some departments have reported rampant spread of MRSA, short for Methicillin-resistant Staphylococcus aureus. Other infectious organisms are also finding their way onto clothing and surviving for long periods of time.

Take Clostridium difficile, for example, generally referred to as "C. diff." It is generally rampant and difficult to treat in hospitals, and it is now finding its way into the first responder sector.

Gear-care challenge

These forms of biological contamination pose new challenges and a rethinking of gear care and maintenance. Yet, the fire service is no stranger to bio-contamination.

In the mid-1980s, the AIDS epidemic drove OSHA to create blood-borne pathogens regulations, which set specific requirements for employers, including fire departments, to have procedures for addressing blood-borne pathogens, including HIV and various forms of Hepatitis.

Approaches such as universal precautions were adopted and personal protective equipment was mandated for protecting workers (firefighters).

The NFPA responded by creating a new standard for emergency medical protective clothing (NFPA 1999), setting barrier requirements to further the OSHA PPE requirements specific to first responders. NFPA 1971, the standard on structural firefighting protective clothing was revised to include tests for viral penetration of moisture barriers and liquid integrity testing of garments.

As part of EMS responsibilities, firefighters were being exposed to airborne pathogens such as reemerging tuberculosis and emerging diseases such as SARS and the H1N1 flu. As a consequence, the fire service became more aware of biological contamination and adapted with new practices, including how they select, use, and maintain their gear.

Bedbug 2.0

While these new biologically based threats may be no less insidious, they too can be managed effectively, Take bedbugs for instance. Over the past several years, bedbugs have had a resurgence after being nearly wiped out during the mid-1990s.

The new bedbugs are more resistant to many insecticides and conventional pest treatments. Most recommendations for ridding textile-based articles of bedbugs involve applying high temperatures (washing and drying at temperature over 120°F) and using special insecticides.

However, turnout clothing is generally prohibited from being washed or dried at temperatures greater than 105°F.

Insecticides pose specific problems. Many are simply not effective, particularly aerosols that may not fully penetrate into all the recesses and gaps in clothing. Moreover, these insecticides pose their own problems and generally have unknown compatibility with clothing materials and could lead lasting residue.

Big chill

Some departments have found that putting clothing in a freezer can be effective in eradicating bedbugs, though it does take a long time.

University of Minnesota research showed that bagging items and placing them in a freezer at 0°F for a minimum of 3.5 days kills bedbugs at all life stages. This time may be decreased to 48 hours if temperatures average below -5°F (note that many household freezers cannot achieve these temperatures).

Bagging the clothing before going in the freezer prevents bedbugs from exiting the items and perishing elsewhere inside the freezer; the bagging also minimizes condensation.

Invisible threat

Emerging infectious diseases being spread to first responders can be bit more challenging. Obviously, the microorganisms that are the seat of this contamination and potential for disease are invisible and show no sign of contamination. Often, the firefighter or emergency responder will not know if they have been exposed unless there is some telltale sign from a victim.

These microorganisms can easily contaminant clothing and some have amazing persistency, remaining viable in textile-based fabrics for extended periods of time, as long as three weeks under ordinary temperature and humidity.

True, an individual's likelihood for infection is affected by many factors, including the dose of the exposure as well as overall health, state of immune system and general physical condition; however, the incidence of infections has been increased.

Clothing considered to be contaminated with a biological contaminant has to be handling in the ways now applied to blood-borne pathogens. It must be assumed to be contaminated and communicable, that is, universal procedures must be applied.

Universal precautions

This includes bagging and isolating the clothing and using examination gloves, facemasks, eye/face protection, and aprons in handling the contaminated clothing. Commercial laundry facilities often use water temperatures of at least 160°F and 50-150 ppm of chlorine bleach to remove significant quantities of microorganisms from grossly contaminated linen.

Studies have shown that a satisfactory reduction of microbial contamination can be achieved at water temperatures lower than 160°F if laundry chemicals suitable for low-temperature washing are used at proper concentrations.

For turnout clothing, these practices do not work. They are too harsh both with the application of high temperatures and particularly the use of bleach that destroys turnout clothing components.

Instead, the proven process is to use disinfection and sanitization agents that are registered by the U.S. Environmental Protection Agency. The EPA has established specific requirements for qualifying these agents for significantly reducing infectious agents.

However, the tests do not cover all microorganisms and care must be exercised in choosing specific agents. For example, not all disinfectants and sanitization agents can be applied to protective clothing. Many are intended only for hard, non-porous surfaces and are not effective for textile-based clothing. Others may have unintended effects on the clothing, reducing its performance properties.

The fire service is always up against new threats and challenges as their mission roles change or expand. The new issues can be dealt with effectively but require new levels of vigilance and attention to details related to maintain adequate levels of safety and health, including the care of its personal protective equipment.

About the author

Sponsored by Globe

Jeffrey and Grace Stull are president and vice president, respectively, of International Personnel Protection, Inc. They are members of several NFPA committees on PPE as well as the ASTM International committee on protective clothing. Mr. Stull was formerly the convener for international work groups on heat/thermal protection and hazardous materials PPE as well as the lead U.S. delegate for International Standards Organization Technical Committee 94/Subcommittees on Protective Clothing and Firefighter PPE. They participate in the Interagency Board for Equipment Standardization and Interoperability and have authored the book, "PPE Made Easy." Send questions or feedback to the Stulls via email.

Tags	>	Exclu	isives	•	Fire Chief	•	Hazards and Hazmat	•	Health & Wellness	•	Personal Protective
Equip	men	it•	Safety	/	Voluntee	er					

JOIN THE DISCUSSION



Please sign in or register to write your own comments below. Before commenting, please read FireRescue1's Commenting Policy

LATEST PRODUCT NEWS

- Don't ditch your helmet for rescue missions just find the right one
- 4 ways to tap the potential of data and use it to improve community health and safety
- Maine FFs call on state CDC to prioritize first responder virus tests after FD outbreak
- The contamination is coming from within the building
- Purging Mr. Hyde: 3 ways to cultivate the good within our ranks

MORE PRODUCT NEWS >

PRODUCT ORIGINALS

- Don't ditch your helmet for rescue missions just find the right one
- Beyond the traditional fire-rescue mission: Loveland's TAC Fire 9 1
- COVID-19: How public safety companies are assisting the frontline pandemic response **9**1
- Face masks: Here's what cops, firefighters, medics and COs have to say about use, policy and effectiveness
- Fire service proximity suits: What firefighters need to know

MORE PRODUCT ORIGINALS >

Copyright © 2020 FireRescue1. All rights reserved.