CREW BOSS™ D R D & FEMSA USER GUIDE

FIREFIGHTER DRAG RESCUE DEVICE USER INFORMATION GUIDE

DRD Jacket Installation

1. Check the DRD label to make sure that the serial numbers on the jacket and DRD are the same.
2. Remove the jacket liner from the outer shell.
3. Place the DRD on the inside of the outer shell back panel (Fig. A).


(Fig. A)


(Fig. B)

4. Insert the DRD handle through the opening at the base of the collar and pull out so that it lines up with the bottom of the hook and loop strip on the flap (Fig. B). Secure the handle with the hook and loop tab and close the flap.


(Fig. C)

5. Replace the liner by inserting the liner sleeves through the large loops (Fig. C).
6. Secure the snaps at the wrists, base of the collar, down the front facings and along the bottom hem.
7. Try the jacket on for comfort and proper fit. If you feel tightness, adjust the DRD as necessary.

Properly Using the DRD

1. Lift the flap located near the collar seam on the back of the coat.
2. Secure a proper grip on the DRD handle and pull outward.
3. Pull or drag the incapacitated fire fighter to safety.
4. Reinstall the DRD according to the instructions provided in the “DRD Jacket Installation” section.

FIREFIGHTER DRAG RESCUE DEVICE USER INFORMATION GUIDE

DRD Inspection

The DRD must be thoroughly inspected upon receipt, after each use or cleaning, after exposure to high heat or chemicals, and after each deployment for at least the following conditions:

1. Soiling
2. Contamination from hazardous materials or biological agents
3. Rips, tears, cuts, holes, and abrasions
4. Thermal damage such as charring, burn holes, melting, or discoloration
5. Loss of seam integrity - broken, pulled, or missing stitches
6. Material integrity – UV light degradation, chemical degradation, discoloration, or broken/frayed fibers
7. Label integrity, legibility

If the DRD or any components are found to be damaged, the coat should be removed from service and arrangements made for immediate repair or replacement of the DRD. Your DRD should be retired when it is no longer serviceable or the cost of repairing it exceeds 50% of the replacement cost.
Retired DRDs should be destroyed to prevent unintended or unauthorized use.

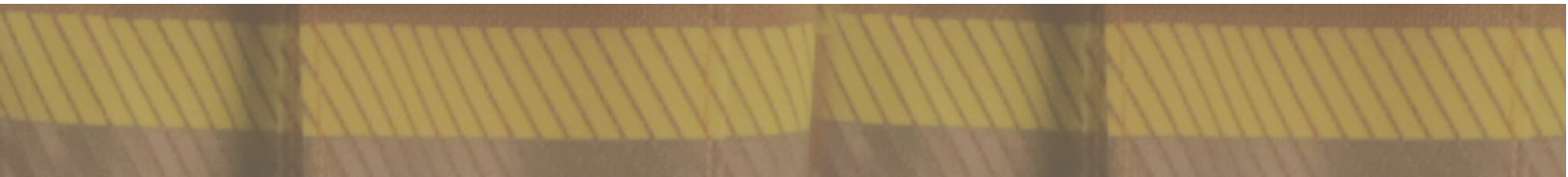
DRD Cleaning

1. Refer to FEMSA Official User Information Guide for detailed instructions.
2. Do not dry clean or use chlorine bleach.
3. Remove the DRD from the coat and place in a mesh bag.
4. Machine wash the DRD separately in warm water (maximum 105° F) using mild liquid detergent.
5. Dry by hanging in a well ventilated, shaded area.
6. Do not store in direct light or in a wet, damp, or contaminated condition.
7. The coat and DRD should be completely dry before reinstallation.

ADDITIONAL ASSISTANCE

If additional assistance is required, Customer Service can be reached at 541-209-6800 ext. 305, or by email at sales@crewbossppe.com; 8AM – 5PM (PST), Mon-Fri.

CrewBoss™
830 Wilson Street I Eugene, OR 97402 I 541-209-6800 ext. 305
Email sales@crewbossppe.com
www.crewbossppe.com



Official User Information Guide

DANGER

- ***Do not use your Protective Ensemble Elements until you have read and understood all labels on your Protective Elements and this Official User Information Guide.***
- ***Only end user shall separate this guide from the element. Remove guide from the element prior to using the element for emergency operations.***

Fire and Emergency Manufacturers and Services Association, Inc.

www.femsa.org

PROTECTIVE GARMENTS

FOR STRUCTURAL AND PROXIMITY FIRE FIGHTING

2018

Official User Information Guide

Protective Garments for Structural and Proximity Fire Fighting

www.femsa.org

#SP1000RE

2018 Revision

Contents

Chapter 1
Introduction

DANGER

Structural and proximity fire fighting and emergency operations are ultra-hazardous and unavoidably dangerous activities. Lack of proper training may lead to death, burns, injuries, diseases, and illnesses. To reduce your risk, do not use your protective ensemble until you have read this guide and have been thoroughly trained by your fire department or employer in fire fighting tactics, safety procedures and the proper use of your protective ensemble.

This FEMSA Official User Information Guide provides warnings, information and instructions related to the selection, care and maintenance of your protective garments designed for either structural or proximity fire fighting. While this guide addresses some aspects of use, it does not in any way cover tactics for fire fighting or emergency operations. To use this guide effectively, you must thoroughly understand its contents and the information provided on the garment product label. Proper training and supervision for use of personal protective equipment in fire fighting and emergency operations is critical to your safety. Contact your supervisor immediately if you are unsure about any aspect related to the selection, use, care, and maintenance of your protective garments.

Organization of Guide

This guide includes warnings and information related to selection, limitations of use, care and maintenance of your protective garments. It is divided into several sections of specific areas of information and instructions for improving your understanding for the proper selection, use, care, and maintenance of your protective garments. These sections include:

- Selection Issues
- Use and Limitations of Protective Clothing
- Inspection
- Cleaning and Decontamination
- Repair
- Storage
- Retirement and Disposal
- Special Incident Procedures

This guide is consistent with the 2014 Edition of NFPA 1851, Standard on the Selection, Care, and Maintenance of Structural and Proximity Protective Clothing Ensembles, which was issued July 2013 by the National Fire Protection Association. It is important for you to refer to NFPA 1851, 2014 edition and to other standards that may apply to your fire department or organization. A list of references and how to obtain copies of these references appear later in this guide.

The glossary contains specific terms important in using and understanding this guide.

Some differences exist between instructions and information for proximity fire fighting protective garments and those for structural protective garments. Where these differences exist, the text is enclosed in a gray box to highlight the differences as applied to proximity fire fighting protective garments. For example:

Sample Proximity text

Types of Warnings

Each section of this guide is important; however, within each section of this guide, different types of warnings are given to attract your attention to specific limitations or potential hazards. Specific "signal words" indicate the level of the severity of the particular warning as shown at right.

Be sure to read the other text in this Guide accompanying any warning as it provides additional important information to assist you in understanding the warning.

DANGER

This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

This red and red border represent Safety Red

WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

This grey and grey border represent Safety Orange

CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

This white and black border represent Safety Yellow

General Precautions

Fire fighting and emergency operations are ultra-hazardous, unavoidably dangerous activities. To reduce your risk of death, burns, injuries, diseases, and illnesses, you must carefully read and strictly follow this entire FEMSA Official User Information Guide and all labels on your protective ensemble.

When you fight fires or engage in emergency operations, you are constantly at risk of death, burns, injuries, diseases, and illnesses. There is no such thing as a "routine" or "ordinary" fire or emergency operation. While use of safety equipment such as a protective ensemble, including this protective garment, can reduce your risk of death, burns, injuries, diseases, or illnesses, it does not make fire fighting and emergency operations completely safe. Even with the use of your protective ensemble, fire fighting is unavoidably dangerous.

This entire guide deals with issues that directly affect your life and safety. Even such matters as how you clean, store and maintain your protective ensemble element, how you put it on and take it off and how well it fits, directly impact your life, safety and well-being. It is important to read and heed this entire guide to reduce your risk of death, burns, injuries, diseases, and illnesses.

- As described in this guide, before and after every use, carefully inspect each element of your protective garment and other ensemble elements for cleanliness, tears, cracks, holes, leakage, missing stitches, soft spots, and any physical damage of any type. You may need to further inspect and evaluate certain elements for specific conditions as described in the Inspection Chapter below. Do not use the element if you detect any condition indicating damage, degradation or weakening of the element's protective capabilities.

- Keep your protective garments clean and properly maintained as described in this Guide. Soiled, contaminated or damaged garments present several different hazards that increase your risk for death, burns, injury, diseases, and illnesses.
- It is impossible for you to test most performance properties of your protective elements in the field. Knowledgeable, experienced and qualified persons within your organization or by qualified facilities should periodically inspect and service your protective elements.
- Your protective garment will age. The usable service life of your garment is dependent on the number, type and degree of exposures, the work environment, frequency of use, and maintenance of the garment. It is the responsibility of both you and your fire department or employer to determine when to take this garment out of service and to do so. Do not use any garment showing signs of damage, weakening or degradation of any protective quality.
- Do not wear clothing or other items under your protective garment that may melt or transfer heat onto your skin (such as, but not limited to, polyester or nylon clothing or metal jewelry).
- Never use your protective garment in fire fighting or emergency operations unless you are at the peak of mental alertness and physical fitness. Do not engage in fire fighting or emergency operations while under the influence of drugs, alcohol or other conditions or factors that would impair your physical and mental abilities.
- You must use extreme caution at all times for all emergency operations. You must be constantly and fully aware of your surroundings, stay alert, react to changing conditions, know (through training) your limitations and the limitations of your equipment (through training, NFPA and OSHA standards). You must avoid exceeding these limitations at all times.

The discussion on hazards in this guide are simply examples of the many circumstances and variable factors that can combine in countless different ways to harm you. It is impossible to list all of the ways in which you may be killed, burned, injured, or suffer disease and illness. No protective ensemble can provide complete protection from all conditions. As a fire fighter or emergency responder you work in an ultra-hazardous environment. Even using your protective ensemble, exercising extreme caution, and with the best training and supervision, your fire fighting and emergency activities remain ultra-hazardous and unavoidably dangerous.

How to Reduce Your Risk

You can reduce, but not eliminate, your risk of death, burns, injuries, diseases, and illnesses through the following:

- Receiving proper training and continual practice in fire fighting and emergency tactics and safety.
- Selecting, maintaining and using your safety equipment properly.
- Exercising extreme caution at all times. Your protective ensemble does not make you completely safe from death, burns, injuries, diseases, or illnesses.
- Understanding the design, performance, and use limitations of applicable versions of NFPA 1971, NFPA 1500, NFPA 1581, NFPA 1851, NFPA 1951, NFPA 1992, NFPA 1994, NFPA 1999, and applicable Federal, state and local regulations specific to the selection, use, care, and maintenance of fire fighting personal protective equipment (e.g., regulations of the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor contained in 29 CFR 1910.132-140, "Personal Protective Equipment," and 29 CFR.1910.156, "Fire Brigades"). You must understand the content of these publications.

Training by Your Fire Department or Employer

This guide does not discuss fire fighting tactics and safety procedures. Your fire department or employer must provide proper training and constant practice in fire fighting tactics and safety procedures consistent with its knowledge and basic approach to fire fighting and emergency operations.

Your fire department or employer is in the best position to know and respond to the dangers present in any fire or emergency operation. Accordingly, your fire department or employer must select the appropriate type of safety gear (including structural or proximity fire fighting protective ensembles) for use at every fire scene or emergency operation.

This guide instructs you on how to maintain and wear elements of your protective ensemble. It also tells you about the limitations of your protective ensemble. No protective ensemble or any other safety equipment protects you from all burns, injuries, diseases, illnesses, conditions, hazards, or death.

To reduce—but not eliminate—your risk of death, burns, injuries, diseases, or illnesses, you must carefully read, fully understand, and strictly follow this entire guide and all labels on your protective ensemble, the NFPA standards, and OSHA and other applicable regulations. The information contained in this guide and on the labels in your protective ensemble are for your safety and can save your life.

Remember, however, that even with the best protective ensemble, safety procedures and training, you are constantly at risk of death, burns, injuries, diseases, and illnesses during fire fighting and emergency operations.

HAVE YOU READ AND UNDERSTOOD THIS FEMSA OFFICIAL USER INFORMATION GUIDE?

The FEMSA Official User Information Guide contains vital safety warnings and important user instructions. Do not use your protective clothing until you have read and understand all information contained in it. Below is a simple worksheet that you should complete before using your protective clothing.

1.	Have you completed all required training in order to properly and safely perform your duties as a fire fighter and emergency worker?	☐ Yes ☐ No
2.	Have you read and do you understand all warnings, precautions, directions, and instructions contained in the FEMSA Official User Information Guide?	☐ Yes ☐ No
3.	Have you read and do you understand the intended use and limitations of your protective clothing contained in the FEMSA Official User Information Guide?	☐ Yes ☐ No
4.	Have you read and do you understand the inspection, cleaning, repair, and maintenance warnings and instructions contained in the FEMSA Official User Information Guide?	☐ Yes ☐ No
5.	Have you read and do you understand the requirements for storage, retirement and disposal of protective clothing contained in the FEMSA Official User Information Guide?	☐ Yes ☐ No
6.	Before using your new protective clothing, have you inspected it and established that it fits you properly as outlined in the FEMSA Official User Information Guide?	☐ Yes ☐ No
7.	Are you familiar with how to obtain replacement guides and how to contact your manufacturer for any additional information you may require as outlined in the FEMSA Official User Information Guide?	☐ Yes ☐ No
8.	Do you understand that the human skin will burn at temperatures much, much lower than the fabrics used in your protective clothing and that you may sustain a burn or other injury with little or no warning?	☐ Yes ☐ No
9.	Do you understand that no protective clothing can protect you from all hazards and/or conditions that you might encounter while performing your job?	☐ Yes ☐ No
10.	Have you read, do you understand, and do you agree to accept the risks and responsibilities outlined in the personal responsibility code located on the back cover of the FEMSA Official User Information Guide?	☐ Yes ☐ No

DO NOT WEAR YOUR PROTECTIVE CLOTHING UNTIL YOU HAVE ANSWERED **YES** TO EACH OF THE THESE QUESTIONS.

Chapter 2
Selection Issues

Selecting your protective fire fighting ensembles entails three parts:

1. Your fire department or employer selects the appropriate protective ensemble to purchase.
2. You, your fire department, or your employer, decide which ensemble to wear for a specific fire fighting or other emergency operation.
3. You ensure that your protective ensemble and ensemble elements are correctly fitted for you and that they work together properly.

While your fire department or employer control some parts of the selection process, you must be aware of the specific hazards that you face during fire fighting and other emergency operations, and ensure that the ensemble and ensemble elements that you are wearing fit correctly and work together to provide the intended protection.

Selection for Purchase

Prior to starting the selection process for structural fire fighting ensembles and ensemble elements and proximity fire fighting ensembles and ensemble elements, your fire department or employer must perform a risk assessment. The risk assessment must include, but not be limited to, the hazards that fire fighters can encounter, based on the following:

- Type of duties performed
- Frequency of use of ensemble elements
- Organization's experience
- Incident operations
- Geographic location and climate
- Specific physical area of operations
- Likelihood of CBRN terrorism incident

OSHA regulations (Title 29, Code of Federal Regulations Part 1910.132, "General Requirements" of Subpart I, Personal Protective Equipment) require that fire departments and organizations conduct a hazard assessment in their selection of fire fighting protective ensembles and ensemble elements. This hazard assessment identifies the specific hazards that fire fighters may encounter and involves a determination of the appropriate personal protective equipment to protect individuals against those hazards.

Each fire department or organization uses a different process for the selection of personal protective equipment for structural and proximity fire fighting. As a minimum, this process must ensure that the protective ensemble and ensemble elements comply with the applicable version of NFPA 1971, Standard on Protective Ensembles for Structural and Proximity Fire Fighting.

Selection for Use

Prior to using structural and proximity fire fighting protective ensembles and ensemble elements, it is essential to understand the differences in types of fire fighting and the protective ensembles available for use.

Types of Fire Fighting and Emergency Operations

Structural fire fighting is the physical activities of rescue, fire suppression and property conservation in buildings, enclosed structures, vehicles, marine vessels, or like properties that are involved in a fire or emergency situation. Structural fire fighting involves a large range of different fire ground hazards and constantly changing conditions.

Proximity fire fighting involves specialized fire fighting operations that can include the activities of rescue, fire suppression and property conservation at incidents involving fires producing high levels of radiant heat as well as conductive and convective heat.

Examples of fires that commonly produce high levels of radiant heat, as well as convective and conductive heat, and could result in incidents incorporating proximity fire fighting operations include, but are not limited to, bulk flammable liquid fires, bulk flammable gas fires, bulk flammable metal fires, and aircraft fires. These operations usually are exterior operations but might be combined with interior operations.

Proximity fire fighting is not structural fire fighting but may be combined with structural fire fighting operations. Proximity fire fighting also is not entry fire fighting. Unlike entry fire fighting, proximity fire fighting does not involve direct entry of fire fighters into flames. Proximity operations are performed close to the actual fire, where the high levels of radiant heat as well as the convective and conductive heat would overcome the thermal protection provided by structural fire fighting protective ensembles. The proximity fire fighting protective ensembles provide enhanced protection from these thermal and radiant exposures.

Entry fire fighting involves extraordinarily specialized fire fighting operations that can include the activities of rescue, fire suppression and property conservation at incidents involving fires producing extreme levels of radiant, conductive and convective heat. Examples of fires that commonly produce extreme levels of convective, conductive and radiant heat and could result in incidents incorporating entry fire fighting operations include, but are not limited to, bulk flammable liquid fires, bulk flammable gas fires, bulk flammable metals, and aircraft fires. Highly specialized thermal protection is

DANGER

Your protective garment is part of a protective ensemble, which is not suitable for all types of fire fighting and all types of emergency operations. Use of an unsuitable protective ensemble may lead to death, burns, injuries, diseases, and illnesses. In order to reduce your risk, your fire department or employer must make a determination as to whether your protective ensemble is suitable for each specific application.

necessary for persons involved in such extraordinarily specialized operations due to the scope of these operations and because direct entry into flames is made. Usually these operations are exterior operations, outside of structures. Entry fire fighting is not structural fire fighting or proximity fire fighting.

Other types of specialized emergency operations include, but are not limited to, hazardous materials emergencies, emergency medical operations, urban search and rescue, wildland firefighting and water operations. Each of these types of operations involves unique hazards and require specialized types of protective ensembles.

Fire Fighting Protective Ensembles

DANGER

This guide does not address the protection provided by structural or proximity protective ensembles that are certified for protection from CBRN Terrorism Agents. This guide does not address and there are no recognized consensus standards for entry fire fighting protective ensembles. Use of structural or proximity ensembles in these situations may lead to death, burns, injuries, diseases, and illnesses.

An ensemble includes your protective clothing and equipment. This ensemble consists of different ensemble elements that must work together to provide the protection from some risks, but not all risks, of emergency incident operations.

Structural fire fighting protective ensembles include, at a minimum, protective garments (coat and pants or coveralls), protective helmet, protective gloves, protective footwear, and protective hood. Each of these elements must be certified to the respective structural fire fighting protective element requirements of NFPA 1971.

Proximity fire fighting protective ensembles include protective garments (coat and pants or coveralls), protective helmet with shroud, protective gloves, and protective footwear. Each of these elements must be certified to the respective proximity fire fighting protective element requirements of NFPA 1971.

Each ensemble also includes other equipment such as respiratory protection, communications equipment and other devices to provide protection from some risks, but not all risks, associated with the emergency incident operations.

NFPA standards exist for different types of ensembles used at other emergency incident operations, including but not limited to urban search and rescue operations (NFPA 1951), hazardous materials emergencies (NFPA 1991 and NFPA 1992), CBRN terrorism incidents (NFPA 1994), wildland firefighting (NFPA 1977) and emergency medical operations (NFPA 1999).

Fire Fighting and Other Emergency Hazards

It is essential that you understand the different types of ensembles and the limitations of protective ensembles to protect against potential hazards. The list of potential hazards that you may encounter during fire fighting and other emergency operations include, but are not limited to:

- Thermal hazards
- Chemical, biological and radiological hazards
- Physical hazards
- Electrical hazards
- Hazards caused by the wearing or use of the equipment itself
- Hazards based on your position and operating area

The frequency and severity of exposure to these hazards vary with the specific locations, operations, conditions, and time. Consequences of exposure to different hazards may range from no effect to death. The risk associated with a hazard is dependent on the likelihood of exposure in combination with the consequences of the exposure.

DANGER

Protective ensembles addressed in this guide do not protect against all hazards and under all circumstances of use. Use of a protective ensemble unsuitable for a specific use may lead to death, burns, injuries, diseases, and illnesses. It is the responsibility of the end user to assess potential hazards and the risk for exposure to determine the suitability of the protection ensemble for a specific use.

Thermal Hazards

Thermal hazards represent extremes of temperatures and heat energy. In the case of fire fighting, the principal hazard is exposure to high temperatures and heat energy that can cause burn injury. In fire fighting, burns are a constant threat regardless of conditions.

Your protective ensemble does not protect you from all burns and injuries. There are limits to the protection your protective ensemble can provide. Though your protective ensemble reduces your risk of burns or injuries, you can still be seriously burned or injured underneath your protective ensemble with no sign of damage to your protective ensemble elements.

Burns are a function of time and amount of heat transferred to the body. You can be burned in relatively low temperature environments if your protective ensemble is exposed to heat or flames for a long enough period of time. Similarly, you can be burned over a very short period of time if your protective ensemble is exposed to relatively high temperatures. Scientists have plotted the times at which different amounts of heat cause human skin to burn on what is called the "burn curve." Whether or not your skin ever reaches the "burn curve" is a function of many variables listed below.

Your protective ensemble is made of heat resistant materials. Even though you may not notice any burn damage to your protective ensemble element, you can still be burned suddenly and without warning. Heat can build up and be stored in your protective ensemble element to the point where your skin burns. Your skin burns at temperatures far below the burning point of your protective ensemble. Do not be misled by the absence of thermal damage

DANGER

If your protective ensemble is exposed to radiant, convective or conductive heat, you may be burned underneath the protective ensemble with no warning and no sign of damage to the protective ensemble. Be constantly alert to the possibility of exposure to radiant, convective or conductive heat and other hazards.

to your protective ensemble. Even without such damage, you may still be burned suddenly and without warning.

DANGER

If your protective ensemble comes in contact with flames, a hot environment or hot object, you may be burned beneath your protective ensemble with no warning and no sign of damage to the protective ensemble. Be constantly alert to the possibility of exposure to flames, a hot environment, hot object and other hazards.

Conductive Heat Burns

Conductive heat is transferred by direct contact with the heat source. Examples of conductive heat transfer would be kneeling on a hot floor, leaning against a hot wall or coming into contact with flames or hot debris. Depending on conditions, this sort of contact can burn you underneath your protective ensemble element with no advance warning and no sign of damage to your protective ensemble.

Suppose, for example, you lean your shoulder against a hot wall at a fire scene. The heat passes from the wall to the shoulder of your protective ensemble by direct contact (conduction). The layers of materials in your protective ensemble are compressed by the weight of your body against the hot surface. If you remain leaning long enough, or if the heat is severe enough, the heat may build up in your protective ensemble and eventually pass through the compressed layers of your protective ensemble and burn your shoulder. The greater the temperature or rate of heat transfer at the surface, the less time it will take for the heat to build up in your protective ensemble and eventually pass through the protective ensemble to burn you. Similarly, a lesser heat source can burn you depending upon the length of time that you are exposed to it. How quickly this may happen depends on the length of exposure, amount of heat transferred, the particular materials used in the protective ensemble elements, the cleanliness and condition of the protective ensemble element, and other factors. Depending on conditions, you may not feel the heat build up in your protective ensemble element before you are burned.

Radiant Heat Burns

Your protective ensemble does not have to be in direct contact with a hot surface or hot object in order for you to be burned. Heat can build up in your protective ensemble and pass through your protective ensemble as the result of exposure to radiant heat. For example, while fighting a fire you may be exposed to radiant heat for a period of time during which your protective ensemble absorbs the heat. Even if you did not compress the system, or if you were to kneel or lean against a non-heated surface, the heat absorbed by the protective ensemble may still be great enough so that you are burned. Merely positioning your body so that the protective ensemble pulls tight against your body (as in squatting so that the knee area is pulled tight across the knees, raising your arm so that the shoulder is tight across your upper body, bending your elbow, etc.) can result in a burn because of compression.

You do not have to be kneeling or leaning against a surface to be burned. You do not have to compress the layers of your protective ensemble to be burned. You may be exposed to a high enough level of radiant heat for a short enough period of time or a low level of radiant heat for a long enough period of time that you may be burned with no compression of the protective ensemble. Depending on conditions, you may not feel the heat build-up in and/or pass through, your protective ensemble, before you are burned.

Convective Heat Burns

Convective heat is transferred by hot gases. Although you may be burned by direct contact with flames, you do not have to come into contact with flames in order to be burned. If your protective ensemble is exposed to heated air or gases at a fire scene, you can be burned. You may not be able to see these heated gases.

The information above concerning conductive and radiant heat burns applies to convective burns as well. You should take into account all of the information pertaining to conductive and radiant heat burns when considering the possible effects of convective heat.

No Such Thing as a "Routine" or "Ordinary" Fire

You can be seriously burned underneath your protective ensemble even though fire scene conditions may not appear to be extreme. You do not have to be near or in contact with flame, hot debris or hot surfaces to be burned. You can be burned underneath your protective ensemble in many different ways. There are many variable factors at every fire scene that may interact to cause such burns. Some of these variables are the type of heat (radiant, convective and conductive) to which you are exposed, the amount of heat, your distance from the heat source, the length of time you are exposed to the heat, and the cleanliness and condition of your protective ensemble element. These and many other variables are constantly changing at a fire scene and can combine to burn you at any moment.

Because there are so many variables that are constantly changing, it is impractical to calculate when or if your skin will reach the temperature on the "burn curve" underneath your protective ensemble sufficient to burn you at any particular time or location at any particular fire scene. Because conditions at a fire are constantly changing, there is no such thing as a "routine" or "ordinary" fire. Every fire scene is unique and the threat that it presents is constantly changing around you. Do not assume that because you have not been burned before at similar fire scenes that you cannot be burned under what appears to be similar circumstances. Any of the variables can combine with other variables in completely unexpected ways to seriously burn you.

Wetness

Getting your protective ensemble wet can, under certain circumstances, increase your risk of burns. Under other circumstances, getting your protective ensemble elements wet can decrease your risk of burns. For example, suppose your protective ensemble gets wet from hose water or your own sweat. Up to a point, the water in the protective ensemble will absorb heat and increase your level of protection from bums. If the water absorbs enough heat, however, it may—as hot water—transmit heat through your protective ensemble to burn you. How quickly this may happen is a function of length of exposure, amount of heat transferred, amount of water in the protective ensemble, which layers of the protective ensemble are wet, which layers are dry, the particular materials used in the protective ensemble, the cleanliness and condition of the protective ensemble, etc. Depending

on conditions, you may not feel the heat build up in and pass through your protective ensemble before you are burned.

Make sure your protective ensemble is thoroughly dry before use. Do not use any portion of your protective garment that is wet from cleaning, from use, or from some other source.

Feeling Heat Under Protective Elements

DANGER

Your protective ensemble and other equipment will lower your ability to feel heat. Do not be misled by the absence of heat or discomfort underneath your protective ensemble or other equipment. Even though you do not feel heat or discomfort, you can be severely burned or injured suddenly and without warning. Be constantly alert to the possibility of exposure to heat and other hazards.

Your protective ensemble lowers your ability to feel heat. You may not feel heat underneath your protective ensemble before suffering a burn. Do not assume that because you are not feeling heat or discomfort through your protective ensemble that you cannot be burned. You must remain constantly alert to the fact that you are operating in an ultra-hazardous, heated environment. While wearing SCBA, ear flaps, a protective hood or other gear, you will be even less able to feel heat. Be constantly alert to the possibility of exposure to heat. You must use extreme caution at all times to limit your exposure to heat.

Different areas of your protective garments may react to heat, flame, and other hazards in different ways. Your protective garment meets all the applicable NFPA standards; however, not all components are equally flame and heat resistant. Depending on the different types of materials (e.g., hook and loop, elastic and small specimens such as emblems) and construction methods used at different areas of your protective ensemble one part of your body may have more or less protection than another part.

Before the use of protective ensemble elements, SCBA and other modern safety equipment, fire fighters were unable to stay too long or go too deep into a fire scene without great discomfort caused by heat and smoke. Protective ensembles, SCBA, and other modern equipment have increased fire fighters' comfort level and level of protection. At the same time, they have reduced fire fighters' ability to feel heat and to be aware of their surroundings. Just because your comfort level has increased, do not assume that you are not at risk. Pay close attention to your surroundings and fire scene conditions. Unless you remain constantly alert, you may get too close to the heat or stay exposed to it for too long. You must use extreme caution at all times and limit your exposure to heat.

DANGER

If you feel heat or some slight discomfort or unusual sensation under your protective ensemble, you may have already been burned or are about to be burned. Remove yourself from the hazardous situation and check for injury. Be constantly alert to the possibility of exposure to heat and other hazards.

If you do feel heat under your protective ensemble, you may still have time to escape injury. The amount of time between feeling pain and actually suffering a burn is called "alarm time." If at any time you feel heat or even minor discomfort or unusual sensation (especially underneath your protective ensemble or other equipment)—sometimes referred to as bee stings—burn injury may be imminent. You should remove yourself as soon as safely possible from the heated environment. If you cannot safely leave, change your body position (e.g., get off a hot surface, back up or turn away from the heat source, etc.) or cool your environment.

No Such Person as an "Ordinary" Fire Fighter

Just as there is no such thing as a "routine" or "ordinary" fire, there is also no such thing as an "ordinary" fire fighter. Each person reacts differently to pain,

excitement, adrenaline rush, and danger. Because of this, some fire fighters have less "alarm time" than others when facing a potential burn situation. These fire fighters may have a very high tolerance for pain or may be less aware of their pain so that they are burned before feeling any pain. You may be burned underneath your protective ensemble with no advance warning. Also, you may encounter such a tremendous temperature that you may be burned before feeling any pain and with no advance warning. You must remain constantly alert to your changing environment and not exceed the limitations of yourself or your equipment.

Molten Substances and Hot Liquids

You may encounter molten metals and other substances as well as hot liquids at the emergency scene. Your protective ensemble may not prevent the effects of or penetration of these hazardous substances under all circumstances. Molten substances may adhere to portions of your protective ensemble and while staying in place transfer high levels of heat energy through your protective ensemble causing an increased risk for burn injury. Similarly, you may come into contact with hot liquids, such as heated water from accumulated hose spray at a fire fighting operation. These liquids may be at temperatures that can burn on contact with little or no warning. You must avoid contact with molten substances and hot liquids during fire fighting and emergency operations to reduce your risk of death, injuries and burns.

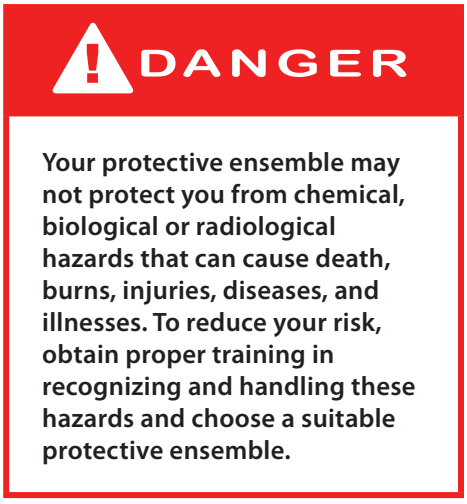
Extreme Cold Temperatures

Even though your protective ensemble is designed to limit your risk to high-temperature, thermal exposures, it does not protect you from all exposures to cold temperatures in the environment or from cryogenic or liquefied chemicals. The ability of your protective ensemble to insulate you in cold environments depends on the ambient temperature, wind speed, levels of moisture, your physical activity, and the length of time you spend in the environment in which you are wearing your ensemble. As with heat exposures, longer exposures at cold temperatures increase the risk of health effects, such as hypothermia and frostbite.

Chemical, Biological and Radiological Hazards

Chemical, radiological and biological hazards (poisons, toxins, carcinogens, radioactivity, germs, infectious bodily fluids, bloodborne pathogens, etc.) that fire fighters and emergency personnel encounter are a matter of life and death. You are at risk of death, injuries, diseases, and illnesses as a result of these hazards. As a fire fighter, you must learn about these hazards and how to protect yourself from them.

There are numerous Federal, state and local environmental regulations and health codes on how to deal with chemical, radiological and biological hazards. For example, OSHA regulations in 29 CFR 1910.120 cover hazardous waste operations and emergency response while 29 CFR 1910.1030 cover employer requirements for reducing employee exposure to bloodborne pathogens. These regulations apply to fire fighters and other emergency responders.



This guide does not address all of the hazards associated with chemical, biological or radiological exposures or how to protect you from them. This guide provides limited information on these hazards and tells only how you should go about cleaning, donning and doffing your protective elements to minimize—but not eliminate—your exposure to these hazards. (See later chapters.)

Chemical Hazards

Chemicals present health, flammability, reactivity, or other hazards. The health hazards associated with different chemicals include, but are not limited to, carcinogen levels, toxicity, sensitization, irritation, and corrosiveness (burns). The specific types of hazards and their severity associated with chemicals vary with the specific chemical and the form in which the exposure occurs. Some hazards may be immediate and show up during or shortly after the exposure occurs. Other hazards may not appear until much later following the exposure, or following repeated exposure, to chemicals.

Chemicals create health hazards by contacting or entering the body through inhalation, skin absorption, ingestion, or injection. While respirators, such as SCBA, are designed to protect fire fighters and emergency responders from inhalation or ingestion of chemicals, protective clothing is designed to limit or prevent contact of chemicals with the skin. The state of the chemicals and their physical properties (density, ease of evaporation, whether as gas or vapor, liquid or solid), affect how you are potentially exposed to chemicals.

Your protective garments are not vapor-proof. Chemical gases and vapors penetrate through many portions of your clothing freely, either through the materials, or more likely, through closures and interface areas of your protective ensemble. Depending on the nature of the chemicals, your skin may be exposed to most vapors or gases while wearing your protective ensemble.

Your protective garments are not liquid-proof. Even though the materials in your protective garment and the overall protective garment design are evaluated for resisting penetration by liquids, liquids may still penetrate and contact your skin. The ability of liquids to penetrate and contact you depend on the type of chemical, its physical properties, the quantity of chemical to which you are exposed, and the conditions at the emergency scene.

Your protective garments do not stop exposure to all solid chemicals. Solid chemicals, particularly soot particles, particulates, and other contaminants may still penetrate to your skin, particularly through closures and interfaces.

Chemicals may also be flammable. The relative flammability of chemicals depends on many factors, including, but not limited to, the state of the chemical, its ease of evaporation and flammable limits. Chemical gases and vapors may accumulate in areas of the emergency scene and present a flash fire hazard. You must avoid flammable vapor exposures. Your protective garment may also absorb hazardous and/or flammable vapors and/or liquids that may later ignite.

Certain chemicals may also present cryogenic and liquefied gas hazards. In this form, chemicals present extreme hazards from cold temperatures and upon release into the environment may create relatively highly concentrated areas of the chemical which present further health and flammability hazards. You must avoid contact with cryogenic and liquefied gas hazards.

Chemicals may also be reactive. Some chemicals react violently, explode or create other hazards when put into contact with incompatible substances. For example, sodium metal reacts explosively upon contact with water. Other chemicals may exhibit severe reactions when exposed to air, heat and other substances. You must avoid contact with known reactive chemicals.

Biological Hazards

Bloodborne pathogens are bacteria, viruses, germs, and similar harmful substances carried in blood and body fluids, which can cause death, diseases and illnesses. While some of your ensemble elements have been tested for liquid penetration resistance and material penetration resistance to viruses, this does not mean that it will protect you under all circumstances from bloodborne pathogens. Even when wearing protective garments certified to the applicable version of NFPA 1971, you are still at risk of death, diseases and illnesses due to contact with such pathogens.

Biological hazards also include, but are not limited to, airborne pathogens, biogenic toxins, biogenic allergens, and bites from insects and animals. The range of effects from exposure to these hazards vary with the type of biological agent. Your protective ensemble elements may limit some exposure to some biological hazards, but do not protect against all biological hazards under all conditions.

Radiological Hazards

There are two types of radiation: ionizing and non-ionizing. Ionizing radiation includes alpha particles, beta particles, gamma rays, X-rays, and other forms of highly energetic radiation emitted from radioactive materials. Exposure to ionizing radiation causes changes in the body that can result in serious or fatal health effects. Non-ionizing radiation includes ultraviolet (UV) light, infrared light, microwaves, and radio frequencies. Different health effects exist with exposure to the different types of non-ionizing radiation. The intensity of the exposure and length of exposure affect how radiological hazards cause effects on the human body. Your protective ensemble does not provide protection from radiological hazards. Therefore, you must avoid contact will all radiological hazards to reduce your risk of death, injuries, diseases, and illnesses associated with radiological exposure.

Even the best protective ensemble cannot protect you completely from chemical, radiological and biological hazards. Protective ensemble elements can reduce—but not eliminate—your risk of death, diseases and illnesses due to these hazards.

DANGER

Your protective ensemble does not comply with visibility requirements for working on a roadway. It will not protect you if you are struck by a vehicle or in a vehicle accident. You should receive training on proper fire fighting and emergency operation conducted on or near roadways and the appropriate protective equipment for doing so. Be constantly alert to the possibility of vehicle hazards. Always remain seated and wear a seat belt while riding in a moving vehicle. Failure to do so may lead to death, burns or injuries.

Traffic and Vehicle Hazards

Activities that distract your full and undivided attention to approaching traffic is a common physical hazard encountered by fire fighters and other emergency personnel. Your protective ensemble is not designed to protect you if you are struck by a vehicle or involved in a vehicle accident. You should always be seated and wear a seat belt when riding in a moving vehicle. You should not operate on or near a roadway without receiving training in the proper way of doing so and appropriate protective equipment. Exercise extreme caution when operating on or near a roadway or around vehicular traffic. The high visibility materials that are part of your protective ensemble are not adequate for you to be seen by approaching traffic or equipment. Your operating conditions may further prevent adequate visibility to drivers or equipment operators

DANGER

Your protective ensemble may not protect you from all physical hazards. Be constantly alert to the possibility of physical hazards. Failure to do so may lead to death, burns or injuries.

Physical Hazards

Physical hazards include, but are not limited to, falling objects, flying debris, projectiles, abrasive or rough surfaces, sharp or jagged edges, pointed objects, slippery surfaces, and excessive vibration.

Different portions of your ensemble may provide limited protection from some hazards and reduce your risk of death, bums, injuries, diseases, and illnesses for some physical hazards under some conditions. Various objects on the fire ground can penetrate, wear away (thereby exposing your skin or underlying layer), cut, and/or puncture your protective ensemble elements or portions of those elements. You may further lose traction while walking, running or crawling, or have your body or parts of your body exposed to excessive vibration. You may sustain injury or be killed from physical hazards that overwhelm the protective qualities of your ensemble. For example, you must avoid building collapses and falls. In the event a building or debris falls on you, you may be at risk of death, burns, injuries, diseases, and illnesses. Explosions and gravity can propel many types of materials with sufficient force to penetrate your protective garment and cause death or injury.

DANGER

Your protective ensemble, wet or dry, may not protect you from electrical shock. Avoid coming into contact with energized electrical wires and equipment, and otherwise avoid electrical current. Failure to do so may lead to death, burns or injuries.

Electrical Hazards

If your protective ensemble comes in contact with a source of electricity, you may be killed, burned or injured due to electrical shock. Even if your protective ensemble is dry, clean and properly maintained, you may be electrocuted or injured from an electrical shock. Water and other fluids conduct electricity. Wet, dirty and/or contaminated protective elements may increase your risk of death, burns and injuries due to electrical shock.

Hazards Caused by the Wearing or Use of PPE

The wearing of your protective ensemble creates a variety of hazards affecting your body or your ability to safely perform required activities at a fire fighting or emergency operation. These hazards are a byproduct of the tradeoffs between providing protection and allowing you to function with restriction. The wearing of any personal protective equipment entails these tradeoffs, and the balance between protection and functionality and comfort is a decision made in the selection of your protective ensemble by your fire department or employer.

Hazards created by the wearing or use of personal protective equipment include, but are not limited to:

- Heat stress
- Loss of functionality
- Wet, soiled, contaminated or damaged personal protective equipment
- Allergic reactions when contacting certain materials

Heat Stress

Heat stress is a leading cause of fire fighter death and injury. Heat stress is an increase in human body temperature and metabolism caused by physical exertion and/or a heated environment which can lead to exhaustion, mental confusion, disorientation, dehydration, loss of consciousness, heart attack, stroke, and other fatal illnesses. Exerting yourself while wearing your protective ensemble (boots, gloves, garments, hoods, shrouds, or helmets) may increase your level of heat stress. Performing strenuous tasks in the heated environment of a fire scene or in warm and/or humid weather may also increase your heat stress.

To reduce your risk of heat stress, you must:

- Know your physical limitations. Consult your physician; be in top physical condition.
- Make sure your protective ensemble and equipment fit properly to allow adequate freedom of movement.
- Avoid undue exertion and/or prolonged exposure to heated environments.
- Recognize and be constantly alert for signs of heat stress. Signs of heat stress include rapid heart rate, labored breathing, weakness, and excessive sweating, or hot, flushed dry skin. Consult your safety officer or physician to learn and recognize the signs of heat stress.
- Be particularly alert for signs of heat stress during warm and/or humid weather.
- At the first sign of heat stress, immediately seek medical help.

Loss of Mobility or Function

Wearing of your protective ensemble correctly may limit your ability to move easily, manipulate objects, see clearly, and communicate with others. You must be aware of the effects of your protective ensemble on your ability to perform certain tasks, and compensate in ways that do not compromise your safety or increase your risk of death, burns, injuries, diseases, or illnesses.

You must also be aware that your protective ensemble or portions of your protective ensemble may prevent you from entering certain confined spaces, restrict movement in other ways or become caught on or entangled in equipment, implements or rough areas of the response environment.

Wet, Soiled, Contaminated, and Damaged Protective Elements

DANGER

Do not use your protective ensemble element if it is wet, soiled or contaminated. Such use may result in death, burns, injuries, diseases, or illnesses. Arrange for proper cleaning or decontamination before use.

Wet, dirty and/or contaminated protective elements can be a breeding ground for germs, bacteria, fungus, and other harmful substances that can cause disease and illness. Your protective ensemble elements must be kept as dry and clean as possible in order to reduce the risk of fungus, infections, diseases, and illnesses.

If your protective element becomes even slightly dirty or contaminated, do not use it. Dirt or contaminants reduce your protective element's protective qualities and increase your risk of death, burns, injuries, diseases, and illnesses. Clean your protective element in strict compliance with this guide, manufacturer's instructions, and all Federal, state and local government environmental regulations and health codes. Do not use chlorine bleach when cleaning your protective element, as it may reduce the strength of your protective element. If you are unsure whether or not your protective element is free of contaminants or dirt, do not use it. Do not use elements that are not thoroughly clean and dry.

DANGER

Do not use your protective ensemble element if it is torn, worn, cracked, abraded, or improperly altered from its original condition. Such use may result in death, burns, injuries, diseases, and illnesses. Repair (if appropriate) or replace your protective ensemble before use.

If your protective ensemble element becomes even slightly torn, worn, cracked, or abraded, or has holes, missing stitches, soft spots or other signs of degradation, do not use it. Tears and worn or abraded spots greatly decrease your protective ensemble's protective qualities and increase your risk of death, burns, injuries, diseases, and illnesses. You and your department or employer should regularly inspect your protective ensemble for signs of wear and tear and to ensure that the protective element has not been modified or altered in any way. Even the most harmless looking changes to the protective element may increase your risk of death, burns, injuries, diseases, and illnesses.

Skin Allergies

The wearing of your protective ensemble may produce skin allergies if you are allergic to specific substances used in the protective ensemble elements or become sensitized to these substances over time. The susceptibility of each individual is different; most individuals do not experience any allergic effects. The wearing of your protective ensemble may cause changes in your skin health and make your skin more susceptible to effects by fire ground contaminants. Further, the accumulation of contaminants in your protective

ensemble elements may become a source of skin reactions and allergies if your protective clothing is not kept clean. If you experience any unusual skin reactions or allergies that you cannot explain, contact your supervisor and seek medical help.

Hazards Based on Your Position and Operating Area

In addition to the hazards described above, which are by no means an all-inclusive list of potential hazards that you might face, you need to be aware that you can encounter hazards that are specific to the circumstances under which you are performing fire fighting or emergency operations. Specific hazards include, but are not limited to:

- **Bodies of water.** Exercise extreme caution around bodies of water. Your protective ensemble does not float and may make swimming difficult.
- **Elevated areas.** Exercise extreme caution when operating on roofs, balconies, ladders, and other elevated areas. Your protective ensemble does not protect you from falls.
- **Moving machinery.** Exercise extreme caution when working around moving machinery. Even with high visibility materials as part of your protective ensemble, you may not be seen by approaching equipment. Your operating conditions may further prevent adequate visibility to equipment operators.
- **Sunlight, ultraviolet light, chlorine bleach, and other gases.** These hazards can weaken the protective qualities of your protective garment. Be particularly careful to avoid these hazards when you store your protective garment between uses.

Ensuring Proper Fit

DANGER

Your protective ensemble must fit properly and interface with your other safety equipment so that the protective layers overlap in all body positions as required by NFPA 1500. Any gaps in your protective layers may result in death, burns, injuries, diseases, or illnesses.

Sizing, Fit and Adjustment

DANGER

Your protective ensemble is designed to be used as a unit. All elements, layers and accessories must be used and be properly in place and adjusted when being used. Failure to do so may result in death, burns, injuries, diseases, or illnesses.

Before each use of your protective ensemble, make sure that it is sized and adjusted to fit properly. Your protective ensemble is made to fit you so that it is not restrictive against your body and does not unduly restrict your movement (see "Loss of Mobility or Function" above). Your protective elements should fit together with your other equipment so that the protective ensemble's protective layers overlap in all body positions. Do not allow gaps in coverage of your body by your protective equipment. As you change your body position, check to make sure that your protective ensemble's protective layers continue to overlap. If your weight or body size changes, your protective ensemble must be refitted or adjusted accordingly.

Requirement for Overlap

NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, requires fire fighters to wear protective equipment such as helmet, hood, gloves, and footwear, sized to the individual user, properly overlapped so that no gaps occur during use, and meeting relevant NFPA performance standards (i.e., NFPA 1971).

According to NFPA 1500, 2018 edition:

- The protective coat and the protective trousers shall have at least a 2 inch (50mm) overlap of all layers so there is not gaping of the total thermal protection when the protective garments are worn.
- The minimum overlap shall be determined by measuring the garments on the wearer, without SCBA, in both of the following positions:
  - (1) Position A—standing, hands together and reaching as high overhead as possible.
  - (2) Position B—standing, hands together reaching overhead, with body bent forward at a 90 degree angle, to the side (either left or right), and to the back.

Consult your fire department or employer for information concerning these and other applicable standards and become familiar with their requirements. You must wear and properly use such equipment to minimize your risk of death, burns, injuries, diseases, and illnesses. Only use protective elements

that fit properly. Never borrow or loan protective elements unless they properly fit the individual wearer.

Components and Layers

Your protective ensemble may also have additional layers, patches, inserts, or protective components at various points, such as the toes, ears, elbows, knees, shoulders, etc., that your manufacturer provides. You must use your protective elements as a unit. Never use your protective ensemble without all layers and components provided by the manufacturer being properly in place. Use all components or layers of the protective ensemble elements together (outer shell, moisture barrier, thermal barrier, reinforcements, inserts, etc.) together. Failure to do so may result in death, burns, injuries, diseases, and illnesses.

Closures

You must fasten all closures (flaps, buttons, hooks, collars, etc.) on your protective ensemble to reduce your risk of death, burns, injuries, diseases, and illnesses. If you do not fasten all closures, there will be gaps in your protection. For example, an open collar may permit hot debris to get under your protective ensemble and burn you. Similarly, an unbuttoned coat may open up and expose you to radiant heat or toxic substances. Failure to fasten all closures and utilize all components may result in death, burns, injuries, diseases, and illnesses.

Drag Rescue Device (DRD)

All protective coats manufactured to the 2007 Edition of NFPA 1971 or later are required to have a drag rescue device, or DRD. The DRD is intended to assist in pulling or dragging an incapacitated fire fighter to safety. The DRD is built into your coat and designed to be readily accessed and deployed to permit rescue of downed fire fighters. The design and method of DRD deployment varies with each manufacturer. The DRD may not be deployable or usable under all circumstances when a fire fighter must be moved.

The DRD is not a safety harness. It is not intended for vertical rescue operations where the downed fire fighter would be raised or lowered.

DANGER

Use the Drag Rescue Device only for rescuing a downed fire fighter by dragging. Do not use the Drag Rescue Device for any other rescue, including but not limited to vertical rescue operations, where the victim fire fighter is raised or lowered. Doing so may result in death or injury.

Chapter 3

Use and Limitations of Protective Clothing

OSHA places the responsibility for selection, approval, maintenance, inspection, and training in the proper use and limitations of safety gear on your fire department or employer (Title 29, Code of Federal Regulations, Section 1910.132). By doing this, OSHA recognizes a simple truth: how you use your protective ensemble is beyond the manufacturer's control. Your fire department or employer controls the circumstances under which you use the protective ensemble and is in the better position to assess the hazards at the fire or emergency scene and to direct the appropriate selection and use of safety equipment including protective ensembles.

Consistent with the OSHA regulations, manufacturers offer your protective ensemble for your fire department (paid or volunteer) or employer to evaluate and decide whether or not the protective ensemble provides an acceptable level of protection for any particular fire or emergency operation. Your department or employer should ensure proper fit and conduct its own testing, evaluation and training in conjunction with qualified safety experts before issuing protective ensemble elements for use by its fire fighters.

Matters that your department or employer at the fire scene should consider on a case by case basis include:

- Whether to use a protective ensemble in fighting a particular fire or emergency response
- Whether to enter a particular burning building
- Whether to remain in a particular burning building
- What parts of the building should be entered

Because the manufacturer of your protective ensemble element cannot predict the many varying conditions existing at each fire or emergency scene, your department or employer must decide the appropriate use of your protective ensemble and its suitability for that use at each fire scene. The manufacturer makes no guarantees or warranties, express or implied, that your protective ensemble is fit for a particular purpose. (See Warranty Information on inside back cover.)

Use your protective ensemble only under the direct supervision of your fire department or employer in a manner consistent with applicable versions

of NFPA 1500 Standard on Fire Department Occupational Safety & Health Program, NFPA 600, Standard on Industrial Fire Brigades, and 29 CFR 1910.132.

NFPA Label

The NFPA label on your protective ensemble element states that your protective element is a structural (or proximity) fire fighting protective element. This does not mean that you cannot be seriously injured as long as you use the protective ensemble only for structural fire fighting (or proximity fire fighting). Even if you limit yourself to structural (or proximity) fire fighting, you are still at risk of death, burns, injuries, diseases, and illnesses as described on the element's label and in this guide. As previously explained, there is no such thing as a "routine" or "ordinary" structural (or proximity) fire, and you must realize that you are at risk at all times during fire fighting operations.

Your structural or proximity protective ensemble alone may not provide protection for fire entry applications or for protection from chemical, radiological or biological agents. You must not use your structural protective ensemble for proximity or entry fire fighting applications. If you use your structural protective ensemble for proximity or entry fire fighting applications, you will be at great risk of death, burns, injuries, diseases, and illnesses.

DANGER

Your structural or proximity ensemble will not protect you for entry fire fighting applications. Use of structural or proximity ensembles for entry fire fighting applications may lead to death, burns, injuries, diseases, and illnesses.

You must not use your proximity ensemble for entry fire fighting applications. If you use your proximity protective ensemble for entry fire fighting applications, you will be at great risk of death, burns, injuries, diseases, and illnesses.

Similarly, your protective ensemble does not protect you from all of the diseases and illnesses caused by poisons, toxins, carcinogens, radioactivity, germs, infectious bodily fluids, bloodborne pathogens, and similar chemical, radiological and biological hazards routinely found at fire scenes or during extraordinary events where chemical, biological, radiological, or nuclear (CBRN) terrorism agents have been accidentally or intentionally released.

Donning and Doffing

WARNING

How you don and doff your protective garments affects your life and safety. You must wear the protective ensemble properly in order for it to reduce your risk of death, burns, injuries, diseases, and illnesses. You must also exercise caution when you remove your protective ensemble to avoid contaminating yourself and others with hazardous substances.

Donning Your Trousers

1. Slip on protective trousers and footwear so that all components or layers of each trouser cuff completely cover and overlap the upper part of each boot. Be sure that the overlap remains in all body positions during use.
2. Sit and bend over to check and adjust for comfortable fit.
3. Fasten fly and all covers leaving no openings or gaps.
4. Fasten all snaps and other closures.
5. Make sure that all components, layers, accessories, and other items provided by the manufacturer are in place.
6. Ensure proper fit, with no tightness or gapping.

Donning Your Coat

1. Slip on the protective coat so the inner flap is properly aligned and fasten all closures so that the closure area is smooth with no openings or gaps.
2. Place your coat collar in the fully extended, "up" position.
3. Secure collar closure completely covering the collar opening. Be sure there are no gaps in coverage.
4. Ensure that all components, layers, accessories, and other items provided by the manufacturer are in place.
5. Check to see if your Drag Rescue Device (DRD) is properly stored for future deployment.
6. Ensure that all layers of your protective coat overlap all layers of your protective trousers by at least 2 inches in all body positions. (See NFPA 1500, 2018 edition.)
7. Ensure proper fit, with no tightness or gapping.

You may measure for adequate overlap by assuming the following body positions without wearing SCBA:

Position A — standing, hands together reaching overhead as high as possible.

Position B — standing, hands together reaching overhead and bending body at waist to the front, the sides and to the back as much as possible.

Donning Coveralls

1. Slip on trouser portion as above.
2. Slip on coat portion as above.
3. Refer to any specific manufacturer instructions for design variations in your protective garments.

Doffing Your Protective Garments

Doffing procedures vary depending on whether or not your protective garment has been contaminated during use.

When emergency doffing is required, immediately seek assistance to remove the garment as quickly as possible, taking care to avoid compressing the garments against the fire fighter's body and avoiding contamination.

No Contamination

1. If there is no contamination, remove your protective garments in reverse order from that described above for donning the protective garments.
2. Inspect each item of protective garments for any damage or change in condition.
3. If you see damage or change in condition, bring this to the immediate attention of your fire department or employer. Such damage or change in condition must be corrected before you may use your protective garment.

If you do not see any damage or change in condition, store your protective garment as recommended in this guide under "Storage."

Contaminated Protective Garments

Doff protective garments contaminated with blood, bodily fluids, toxins, radioactivity, chemicals, and/or hazardous materials with special care by taking the following precautions:

- Avoid unprotected bodily contact with any contaminated area of your protective ensemble.
- (See current versions of NFPA 1999 and 1581 for procedures and types of garments and equipment to be used in handling protective garments contaminated with biologically hazardous materials. See current version of NFPA 1992 for similar information concerning chemical hazards.) Avoid spreading the contaminants from your protective garments to your personal belongings, your living quarters and/or interior spaces in buildings and vehicles.
- Remove your protective garments in reverse order from that described above for donning the protective garments.
- Place contaminated protective garments in a sealable, leak-proof, air tight bag.

Avoid unprotected bodily contact with contaminated areas of your protective garments. Avoid contact between contaminated protective garments and your personal belongings, your living quarters and/or interior spaces in buildings and vehicles. Such contact may increase your risk of death, burns, injuries, diseases, and illnesses.

- Dispose of contaminated protective garments in accordance with applicable Federal, state and local laws.
- If you intend to reuse a protective garment, it must be decontaminated in accordance with the instructions found in this guide before you or anyone else may have unprotected bodily contact with it.

Modifications, Alterations and Markings

WARNING

Modifying, changing, adding to, marking, painting, or altering your protective element in any way may affect its protective qualities and increase your risk of death, burns, injuries, diseases, and illnesses.

Do not modify, change, mark, paint, or alter your protective elements without the manufacturer's written authorization.

Chapter 4
Inspection

General Inspection Requirements and Warnings

WARNING

You must inspect your protective garment regularly for evidence of damage or changes. If you are uncertain about the condition of your protective garment, do not wear it and seek assistance from the appropriate person in your fire department or organization. Failure to regularly inspect your protective garment increases your risk of death, burns, injuries, diseases, and illnesses.

Inspect your protective garments regularly. When your garments first arrive, you and your fire department or employer should inspect them. Thereafter, you should inspect your protective garments at least once a month, after each cleaning and after each use of any kind.

Inspect your protective garments in accordance with NFPA 1851, 2014 edition, Standard on Selection, Care, and Maintenance of Structural and Proximity Fire Fighting Protective Ensembles. NFPA 1851, 2014 edition establishes requirements for both routine inspections and advanced inspections.

NFPA 1851 requires that:

- Individual users routinely inspect their own protective garments after each use.
- Independent service providers (ISP) or personnel in your fire department or organization who have received training in the inspection of protective garments should conduct advanced inspections at a minimum of once every 12 months or whenever routine inspections indicate that a problem could exist.

Independent service providers (ISP) must receive verification according to the criteria in NFPA 1851, 2014 edition. Personnel conducting inspections of protective garments must have written verification of training from the original manufacturer or verified ISP.

Additional provisions are followed for the inspection of the moisture barrier contained in the lining of your protective garment.

Routine Inspections

You and your fire department or employer should inspect your protective garments upon receipt, and thereafter at least once a month, after each cleaning, and after each use of any kind. Your protective garments should be inspected for:

- Proper fit
- Soiling
- Contamination
- Physical damage such as, but not limited to, rips, tears, cuts, and abrasions
- Damaged or missing hardware and closure systems
- Thermal damage such as charring, burn holes, melting, or discoloration of any layer
- Damaged or missing reflective trim
- Loss of seam integrity and broken or missing stitches
- Correct assembly and size compatibility of shell, liner and the Drag Rescue Device (DRD).

In examining your protective garments, you should examine all readily visible areas of the garment, including the shell, components on the shell such as trim, hardware, reinforcements, and pockets, and the liner. It is essential that your Drag Rescue Device (DRD) be properly installed and free from damage.

You should inspect the DRD components that are included with protective garments for the following:

- Proper installation in garment
- Soiling
- Contamination
- Physical damage such as, but not limited to, cuts, tears, punctures, abrading, cracking, or splitting
- Thermal damage such as, but not limited to, charring, burn holes, melting, or discoloration
- Loss of seam integrity and broken or missing stitches

You should inspect interface components, such as wristlets and other devices that permit integration of other ensemble elements with your garment, for the following:

- Soiling
- Contamination
- Physical damage
- Loss or reduction of properties that allow a component to continue as an effective interface, such as, but not limited to, loss of shape or

loss of ability to remain attached to the respective element(s) where attachment is required

- Loss of seam integrity and broken or missing stitches

In addition to the items above, you should inspect proximity fire fighting protective garment outer shells for loss of reflectivity and loss of reflective coatings.

Remember, whenever you have a question about the condition of the protective garment, you should temporarily remove the garment from service and refer to the manufacturer or verified independent service provider (ISP) for evaluation.

Your fire department or employer must develop and use standards and guidelines for determining whether or not your protective ensemble elements pass inspection and can continue to be used for fire fighting and emergency operations.

If inspection discloses any damage or deterioration to any protective element, do not use it and do not attempt to repair it. Consult your fire department or employer as to the proper steps to be taken in dealing with the damaged protective element.

Advanced Inspections

WARNING

Some trim may have lost its reflectivity (by being clogged with dirt or affected by heat and/or water) even though the deterioration is not visible under normal daylight conditions.

Advanced inspections are the responsibility of your fire department or organization. Only trained individuals from either your fire department or organization or a verified ISP can perform advanced inspections. ISPs must be verified by meeting requirements established in NFPA 1851, 2014 edition, Standard on Selection, Care and Maintenance of Structural and Proximity Fire Fighting Protective Ensembles.

Qualified personnel should conduct advanced inspections at a minimum of every 12 months, more frequently as deemed necessary based on the condition of your protective garments or decisions made by your fire department or organization.

Advanced inspections involve a more detailed examination of your garment for different types of damage or changes. Advanced inspections also involve limited non-destructive testing of your garment. For example, inspectors can examine the reflective qualities of trim on protective garments by testing reflective trim in a darkened area using a flashlight.

WARNING

The moisture barrier in your protective ensemble has not been evaluated for all chemicals that can be encountered during fire fighting operations. The effects of chemical exposure on the moisture barrier are to be evaluated by the user per the inspection procedures in the current edition of NFPA 1851.

Inspection of Moisture Barriers

While all materials and components in garment elements are susceptible to different types of damage from wear or abuse, the moisture barrier, with its film or coating side of most moisture barriers facing the interior of the liner, is one of the most difficult parts of the garment element to inspect and evaluate. Even when a garment element is equipped with a means of opening the liner to view the film or coating side, it is difficult to conduct a visual evaluation of the moisture barrier film or coating. Even a physical examination of the moisture barrier film or coating side may not detect all types of

damage or defects that can lead to loss of liquid penetration resistance for the garment element.

Frequently examine moisture barrier at high wear areas, including but not limited to elbows, under the arms, seat areas, and knees, to ensure there has been no abrasion or deterioration in the liquid resistant coating of the barrier layer. In the event of either questionable appearance or characteristics, return the garment to the manufacturer for expert analysis to determine whether the garment's protective qualities have been altered. Never make moisture barrier repairs in the field.

NFPA 1851, 2014 edition contains different specific test procedures for the evaluation of moisture bathers and liners found in your protective garments. Only trained personnel meeting the requirements of NFPA 1851, 2014 edition should conduct these test procedures.

The two test methods include:

- Shine a light behind portions of the liner to show if an area of the barrier material has been compromised based on differences in the amount of light showing through the liner. Be sure to use a light that is bright enough to show changes in the density of the liner materials but not hot enough to damage the liner materials. Place the light in a position that does directly contact the liner composite. The light should be sized to fit into sleeves of protective coats.
- Using an alcohol-water mixture consisting of 1 part rubbing alcohol (70% isopropyl) and 6 parts tap water and pouring one cup of this mixture into "cupped" portions of the liner representing areas of the liner you are evaluating. If liquid passes through the liner after 3 minutes, there is the possibility that a leak exists. This method requires that you clean and dry the liner following the evaluation. Be sure to remove all traces of the alcohol-water mixture after the test.

It is best to perform both methods when the liner is separated from the outer shell. Only trained personnel in your department or organization who follow the specific procedures provided in NFPA 1851, 2014 edition should perform these tests.

NFPA 1851, 2014 edition requires that after 3 years in service (2 years for a protective ensemble with optional CBRN protection), your protective garment be subject to a complete liner inspection in which both sides of the liner are examined and tested for continued integrity.

Limitations of Inspection

Though most performance properties of the protective ensemble can not be tested adequately in the field, OSHA regulations require your department or employer to regularly inspect your protective ensemble and other safety equipment. Your fire department or employer should have a systematic, routine and regularly scheduled inspection of your protective ensemble and other equipment. Full documentation and records of these inspections should be kept.

Record Keeping

NFPA 1851, 2014 edition requires that your fire department or employer compile and maintain records on your protective garments. The following records must be kept:

- Person to whom the protective garment is issued
- Date and condition of the garment when issued
- Manufacturer name and model name or design
- Manufacturer's identification number, lot number or serial number
- Month and year of manufacture
- Date and findings of advance inspections
- Dates of advanced cleaning or decontamination
- Reason for advanced cleaning or decontamination and who performed cleaning or decontamination
- Dates of repairs, who performed repairs and brief discussion of repairs
- Date of retirement
- Date and method of disposal

Chapter 5

Cleaning and Decontamination

General Cleaning Requirements and Warnings

DANGER

You must keep your protective garments clean and free of contamination. If you do not keep your protective garments clean, you increase your risk of death, burns, injuries, diseases, and illnesses.

It is important to maintain the cleanliness of protective garments. Soiled or contaminated protective garments are a hazard to fire fighters as soils and contaminates can be flammable, toxic or carcinogenic. Additionally, soiled or contaminated protective garments can have reduced protective performance. Clean protective garments offer you better protection and proper cleaning can add to the life of the protective garment; therefore, you should clean protective garments whenever they become soiled.

Some fire fighters prefer the appearance of well-used, discolored, "salty", and/or dirty protective garments as an indicator of their experience and status as veteran fire fighters. These individuals are at grave and unnecessary risk of death, burns, injuries, diseases, or illnesses. You must keep your protective garments clean and maintain them as set forth in the garment labels and this guide. This is not merely a question of style, neat appearance and comfort, it is a matter of life and death.

In everyday use, personal protective equipment becomes dirty by absorbing sweat from the wearer and soils, soot, and so forth from the outside environment. Cleaning of ensembles and ensemble elements will assist in removing these substances. Ensembles and ensemble elements can also become contaminated with other substances, principally hazardous materials, particulates and body fluids. The removal of these substances is most often referred to as decontamination. In structural and proximity fire fighting, both general cleaning and decontamination of ensembles and ensemble elements might be needed.

Health Risks of Soiled or Contaminated Protective Garments

Soiled or contaminated protective garments can expose fire fighters to toxins and carcinogens that enter the body through ingestion, inhalation or absorption. Repeated small exposures to some contaminants can add up over time and cause health problems. Although safety is important to avoid injury

or inhalation hazards while working on the fire ground, you can inadvertently carry many of the toxins that lead to health risks away from the fire scene on your protective garments and equipment.

Toxins you may encounter at a fire scene can become trapped within the fibers of soiled protective garments or absorbed into the materials themselves. Contact with the soiled protective garments increases the risk of the toxic contaminants being introduced into the body. Protective garments contaminated with body fluids presents a potential risk of a communicable disease being transmitted to the person coming into contact with the contaminated protective garments.

Reduced Performance Hazards of Contaminated Protective Garments

When protective garments become laden with particles and chemicals, other problems besides exposure to toxins and carcinogens are introduced, such as the following:

- Soiled protective garments typically reflect less radiant heat. After materials are saturated with hydrocarbons, they tend to absorb rather than reflect the radiant heat from the surrounding fire.
- Protective garments heavily contaminated with hydrocarbons are more likely to conduct electricity, increasing the danger when entering a building or vehicle where wiring can still be live.
- Protective garments impregnated with oil, grease and hydrocarbon deposits from soot and smoke can ignite and cause severe burns and injuries, even if the materials are normally flame resistant. Individual fire fighters can still encounter various chemicals in their normal fire fighting activities, even if they are not involved in a response as part of a specialized hazardous materials response team. Exposures to oils, fuels and lubricants can occur around fire station vehicles. During responses, exposures to liquids ranging from pesticides to acids to chemical solvents can occur, with or without the fire fighter's knowledge.
- These contaminants, in addition to being hazardous, can also degrade ensembles and ensemble elements in the following ways:
  - Clothing fabrics can become weakened and tear more easily.
  - Thread or seam sealing tape can become loose.
  - Flame retardant or water repelling treatments can be removed.
  - Visibility markings can become less visible and/or lose fluorescent, retroreflective, radiant reflective properties and/or markings.
  - Ensemble and ensemble elements hardware can become corroded.

Any exposure to CBRN terrorism agents warrants immediate disposal of the protective garments in accordance with all applicable Federal, state and local regulations. Protective garments that have been exposed to CBRN terrorism agents should not be inspected, cleaned or repaired.

Other General Warnings

WARNING

Soiled or contaminated protective clothing ensembles can expose not only you, but also fellow fire fighters, family members and others to the toxins and carcinogens described in this guide. To reduce the risk of death, injuries, diseases, and illnesses to you and others, do not take soiled or contaminated elements home or into living quarters in your firehouse.

Do not take soiled or contaminated elements home. Do not wash soiled or contaminated elements in home laundries or in public laundries unless the public laundry has a dedicated business to handle protective garments.

Do not commercially dry clean your protective garments. Commercial dry cleaning is generally not recommended for cleaning protective garments. Some dry cleaning solvents can damage components of the protective garment. Consult with the protective garment manufacturer prior to dry cleaning to learn whether or not dry cleaning will damage your protective garment.

Types of Cleaning

NFPA 1851, 2014 edition, Standard on Selection, Care and Maintenance of Structural and Proximity Fire Fighting Protective Ensembles, defines four types of cleaning:

Routine Cleaning is the light cleaning of protective garment performed by the end user without taking the garment out of service. Examples include brushing off dry debris, rinsing off debris with a water hose and spot cleaning.

Advanced Cleaning is the thorough cleaning of protective garments by washing with cleaning agents. Advanced cleaning usually requires garments to be temporarily taken out of service. Examples include hand washing, machine washing and contract cleaning.

Contract Cleaning is cleaning conducted by a facility outside the fire department or organization that specializes in cleaning protective clothing.

Specialized Cleaning is cleaning to remove hazardous materials or body fluids. This level of cleaning involves specific procedures and specialized cleaning agents and processes.

Routine Cleaning

You are responsible for the routine cleaning of your protective garments. As part of this process, you should examine the manufacturer's label, consult these instructions and refer to NFPA 1851, 2014 edition for additional information to carry out the routine cleaning of your protective garments.

Routine cleaning immediately after the termination of an incident can remove substantial amounts of surface contaminants before they have a chance to "set in." This can also help to limit the transfer of contaminants to apparatus and stations. Routine cleaning of your garments as soon as possible after an exposure to harmful contaminants can remove those contaminants.

Where possible, you, your fire department or employer should evaluate the contamination levels of your protective garments and initiate routine cleaning at the emergency scene. As part of this process, you should adhere to the following steps:

1. Isolate your protective garments and outer shell and liner layers whenever possible to avoid cross contamination.

2. Brush off any dry debris.
3. Gently rinse off other debris with water.

   Do not use heavy scrubbing or spraying with high velocity water jets such as a power washer.
4. Where necessary, use a soft bristle brush to gently scrub the protective garment and rinse off the protective garment again.

Hand Washing

Where necessary, additional routine cleaning procedures for cleaning protective garments should only be used for spot cleaning of the protective garment and should be performed in a utility sink. This routine cleaning should be performed in a utility sink designated for personal protective equipment (PPE) cleaning and decontamination using the following procedures:

1. Before you begin, be sure to wear protective gloves and eye/face splash protection.
2. Pre-treat heavily soiled or spotted areas.

   DO NOT USE chlorine bleach, chlorinated solvents, active ingredient cleaning agents, or solvents without the garment manufacturer's approval.
3. Set the water temperature. Do not exceed a water temperature of 105°F (40°C).
4. Use mild detergents with a p1-l range of not less than 6.0 pH and not greater than 10.5 pH as indicated on the product MSDS or original product container.
5. Scrub the protective clothing gently using a soft bristle brush.
6. Thoroughly rinse the protective garment.
7. Inspect the protective garment. Where necessary rewash or submit it for advanced cleaning procedures.
8. Consult the manufacturer if you require stronger cleaning agents.
9. Dry the protective garments following drying guidelines below.
10. Rinse the utility sink following the routine cleaning procedure.

DO NOT clean outer shells and other radiant reflective components of proximity fire fighting protective ensembles and ensemble elements with a brush, or other abrasive cleaning devices, or using mechanical action.

Where routine cleaning fails to render the protective garment sufficiently clean for service, submit the proximity fire fighting protective garment for advanced cleaning.

When cleaning of the entire protective garment is necessary, refer to the advanced cleaning procedures below.

Advanced Cleaning

Submit your protective garments for advanced cleaning at a minimum of once every 12 months or as otherwise required in accordance with the most current edition of NFPA 1851. Advanced cleaning must be performed by a verified (ISP or trained personnel of the fire department or your organization. The ISP should be verified in accordance with NFPA 1851, Standard on Selection, Care and Maintenance of Structural and Proximity Fire Fighting Protective Ensembles. Your original manufacturer of the protective garment or a verified ISP will determine the level of training for individuals in your fire department or organization for conducting advanced cleaning.

Advanced cleaning should involve the following:

- Soiled protective garments shall receive advanced cleaning prior to reuse.
- Issued and used protective garments should receive advanced cleaning at the time of advanced inspection if not subjected to advanced cleaning in the previous 12 months.
- The training of the fire department's or organization's personnel should be performed by the element manufacturer or a verified ISP who will provide written documentation of training.
- You should examine the manufacturer's label of your protective garment to determine if there are any unique instructions on cleaning and drying that the manufacturer provided with the element. In the absence of unique manufacturer's instructions or manufacturer's approval of alternative procedures for the protective garment, use the advanced cleaning and drying procedures provided in this section.

Machine Washing

Machine cleaning is the most effective method for cleaning ensemble elements such as coats, trousers, coveralls and hoods. It is the most effective means of loosening and removing dirt, soot and other debris. There are two basic types of automatic washing machines commonly available: the top loading agitator style and front-loading washer/ extractors. New technologies in the cleaning industry that affect the options available to both the end user as well as the ISP are emerging every day.

Front load machines are more appropriate for protective clothing, where allowed by the garment manufacturer. It is very important for machine operators to monitor and adjust for correct water temperatures, detergent and additive selection and g-forces of the spinning/extraction cycle for each garment type being laundered. These factors have a significant impact on cleaning thoroughness and maintenance of protection factors inherent in each element, as well as extending the life expectancy of garments by carefully adhering to manufacturer's recommendations of cleaning processes.

Some of the advantages and disadvantages of each type of machine include:

- **Top Load Washers.** Top load machines generally use a center post agitator to whisk water through the fibers of garments, and

are designed to clean multiple garments of minimum bulk. Most recently, however, top loaders have become available without the center post. It is generally accepted that a top loader with a center post agitator is more damaging to ensembles and ensemble elements than front load machines. Top load agitating machines have the potential to reduce the longevity of garments due to mechanical damage. If top load machines are used, we recommend stainless steel wash tubs to protect against rusting and chipping and the associated wear on garments.

- **Front Load Washers.** Front load washers have a door on the front of the machine through which garments are loaded. These washers clean by lifting garments out of the water and gently dropping them back into the water. These units provide better mechanical action because of the size and type of rotation, as well as the degree of extraction. They have various capacities and are designed to handle heavy loads of bulky items, and also to save water and energy. For these reasons, most experts agree that front load machines are more appropriate for protective clothing.

Unless specifically prohibited, conduct advanced cleaning of protective garments by machine using the following procedures as specified in NFPA 1851, 2014 edition:

- If the protective coat has a Drag Rescue Device (DRD) and the DRD is removable, remove the DRD prior to the coat being laundered.
- If the DRD also requires cleaning, place it in a separate mesh bag for washing and drying.
- Where the outer shells and liners of protective garments are separable, clean outer shells with outer shells and liners with liners.
- Turn separable liner systems inside out so the moisture barrier is on the inside for both machine washing and machine drying.
- Do not over load the machine.
- Pre-treat heavily soiled or spotted areas. DO NOT USE chlorine bleach, chlorinated solvents, active ingredient cleaning agents, or solvents without manufacturer's approval.
- Fasten all closures, including pocket closures, hook and loop, snaps, zippers, and hooks. Do not exceed a water temperature of I05°F (40°C).
- Use mild detergents with a pH range of not less than 6.0 pH and not greater than 10.5 pH as indicated on the product MSDS or original product container.
- Do not use a machine that exceeds an acceleration of 100 Gs (980 m/s2).
- Follow the specific machine manufacturer's instructions for proper setting or program selection for the protective garments you are washing.
- Inspect and rewash the protective garment if necessary.
- Where the machine is also used to wash items other than protective

ensemble elements, rinse the machine out by running the machine without a laundry load through a complete cycle filled to the maximum level with water at a temperature of 120°F to 125°F (49°C to 52°C), and detergent.

- Dry the protective garments as described under Drying below.

The waste water from the washing machine must be handled and disposed of in accordance with Federal, state and local law.

DO NOT clean outer shells and other radiant reflective components of proximity fire fighting protective ensembles and ensemble elements with a brush or any other abrasive cleaning devices.

Unless specifically permitted by the manufacturer, do not machine wash or machine dry outer shell and other radiant reflective components of proximity fire fighting protective garments.

Drying Procedures

Examine the manufacturer's label for any unique instructions on drying procedures specific to your protective garment. Where there are no unique manufacturer's instructions or manufacturer's approval of alternative procedures, use either air drying or machine drying procedures below:

Air Drying

- Place elements in an area with good ventilation
- Do not dry in direct sunlight

Machine Drying

- Do not exceed the recommended capacity of the machine.
- Fasten all closures, including pocket closures, hook and loop, snaps, zippers, and hooks.
- Select a "no-heat" or "air dry" option, if available.
- In the absence of a "no-heat" or "air dry" option, use a basket temperature (dryer temperature setting) that does not exceed 105°F (40°C).
- Discontinue the use of a heat cycle prior to the removal of all moisture from the protective garment.
- Accomplish the remainder of the drying process by a "no-heat" machine setting or removal of the protective garment from the machine dryer to air dry.

Air drying is the most appropriate method for drying protective garments. It causes no mechanical damage and little or no shrinkage. The most efficient method of air drying involves forced air ventilation. For this method of drying, simply use fans to re-circulate air inside a room where protective garments are drying. The basic drying room should include floor drains, a method to

exchange the air to the outside environment, and drying racks for hanging protective garments to provide maximum air exposure. Overall drying time is dependent on the efficiency of the drying room and the ambient conditions. Heating of the room or the inlet air at temperatures up to 100°F (38°C) can further improve the efficiency of the drying process. Drying protective garments in ambient air, as opposed to drying rooms, takes a considerable length of time depending on the ambient environmental conditions.

Most manufacturers do not recommend machine drying of protective garments. During operation, dryers can reach very high basket temperatures that may damage garments. Machine drying also includes mechanical action that can cause damage to protective garments.

Contract Cleaning

If an independent service provider (ISP) cleans your protective garment rather than trained personnel of your fire department or employer, it is the responsibility of your fire department or employer to ensure that the independent service provider (ISP) is knowledgeable enough to provide adequate service and not cause damage to your protective garment. Specific guidelines for making this determination are provided in the appendix of NFPA 1851, Standard on Selection, Care, Maintenance of Structural and Proximity Fire Fighting Protective Ensembles.

Specialized Cleaning and Decontamination

If your protective garments become contaminated with chemical, biological or radiological hazardous materials, you must follow special procedures in handling your protective garments and decontaminating them.

Follow the warnings and instructions for doffing contaminated protective garments in this guide.

Hazardous Materials

If you or others know or suspect that your protective garments have become contaminated with hazardous materials, members of your fire department or organization who are authorized to conduct a preliminary assessment of the extent of contamination must evaluate the garments on the incident scene. Personnel qualified to assess your protective garments for hazardous materials may include persons from your health department, hazardous materials team or other persons qualified in understanding different forms of contamination and appropriate remediation procedures.

If the garments are deemed contaminated, the protective garments must be isolated during the incident personnel decontamination process and removed from service until the contaminant(s), or suspected contaminant(s), is identified and the elements can receive specialized cleaning as necessary to remove the specific contaminant(s).

WARNING

If your protective ensemble is contaminated, you must follow procedures mandated by Federal, state and local law for handling and/ or decontaminating your protective garments. Failure to do so may increase your risk of death, burns, injuries, diseases, and illnesses. Protective garments that are contaminated by CBRN terrorism agents must be immediately retired after confirmed exposure and shall not be subjected to cleaning or decontamination.

Read and follow the doffing warnings and instructions in this guide to reduce your risk of death, burns, injuries, diseases and illnesses.

Where possible, and where the contaminant and its source have been identified, your fire department should consult the supplier of the contaminant and the manufacturer of the ensemble and ensemble elements for an appropriate decontamination agent and process. Only expert decontamination professionals who have established procedures for the removal of blood and other hazardous materials, and use techniques developed to minimize damage to your protective garments, should perform the decontamination process. The decontamination professional must adhere to all applicable Federal, state and local laws regarding the decontamination of medical, radiological and chemical contaminated products.

Body Fluids

Protective garments that are known or suspected to be contaminated with body fluids must be evaluated on the incident scene by members of the organization authorized to conduct a preliminary assessment of the extent of contamination and need for the ensemble or ensemble elements to be isolated, tagged and bagged at the incident scene. Your fire department and employer is required by OSHA regulations in 29 CFR 1910.1030 to have written procedures detailing the decontamination and cleaning processes for personal protective equipment contaminated with body fluids.

Follow universal precautions when handling cleaning and decontamination of any ensemble or ensemble element contaminated by body fluids. Universal precautions include member self protection with the use of gloves, aprons, full torso covers, arm covers, and eye/face protection. In addition, cleaning of contaminated ensembles and ensemble elements should take place in a designated area with sinks and counters made of materials such as stainless steel that can be adequately decontaminated following an element cleaning procedure. Organizations should ensure appropriate decontamination agents are available for members' use as well as applicable procedures for each type of ensemble and ensemble element. NFPA 1581, Standard on Fire Department Infection Control Program, should be consulted for additional guidance. As a minimum, persons involved in cleaning contaminated ensembles and ensemble elements should wear cleaning gloves, an apron and eye/face protection device that conform to NFPA 1999, Standard on Protective Clothing for Emergency Medical Operations.

Chapter 6
Repair

DANGER

Do not attempt to repair your protective garments. Only the original manufacturer, a verified ISP, or member of your fire department or organization that has been trained by the original manufacturer or an ISP should repair your protective garments. Improper repair of your protective garments may increase your risk of death, injuries, diseases, and illnesses.

You must maintain your protective garments. The maintenance of your protective garment may occasionally require repairs. Maintenance must be performed as needed on worn areas, tears, missing stitches on all layers, hardware detachment, changes in coloration, etc. Any loose stitches, any ripped areas and any detached trim or loose pockets must be repaired before the garment's next use. Because the performance of your protective garment is dependent on its condition and quality of any repairs to improve its condition, only the original manufacturer, verified ISP or a member of your fire department or the organization who has received training by the manufacturer or an ISP in the repair of protective garments should repair your protective garments.

Protective garments may require advanced cleaning, when necessary, before any repair work is performed.

All repairs and alterations must be performed in the same manner and using like materials as used by the original garment manufacturer, including, but not limited to, fabric, thread type, seam construction, hardware, and hardware backing, unless approved by the garment manufacturer. These repairs must use materials and components that are compliant with NFPA 1971, Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting. Due to the different methods of construction, you, your fire department or employer must contact the original manufacturer if you are unsure of whether a repair can be accomplished without adversely affecting the integrity of the protective garment.

All repairs must be made in accordance with NFPA 1851, 2014 edition, Standard for Selection, Care and Maintenance of Protective Ensembles for Structural and Proximity Fire Fighting. NFPA 1851 distinguishes between basic repairs that can be made by the original garment manufacturer, by both verified and non-verified organizations, and by both verified and non-verified ISP's. Basic repairs are limited to the following:

- Patching of minor tears, char marks and ember burns to a separable outer shell
- Repairing of skipped, broken and missing stitches to a separable outer shell
- Replacement of missing hardware, excluding positive closure systems to a separable outer shell
- Re-closing of the liner of a garment after inspection

All other repairs are considered advanced repairs and must be made by the original garment manufacturer, a verified organization, or a verified ISP that meets the qualification and requirements as specified in NFPA 1851, 2014 edition.

Chapter 7
Storage

WARNING

Do not store your protective garment:

- **In direct light, especially sunlight or expose your protective garment to direct light when not being worn**
- **Wet or with any layers that are moist**
- **In contact with potential contaminants In temperature extremes**

Improper storage may reduce the effectiveness of your protective garment and increase your risk of death, burns, injuries, diseases, and illnesses.

Store your protective garment properly to maximize its service life, minimize effects that may diminish its performance and reduce potential health hazards. Improper storage may result in permanent damage to your protective garment and increase your risk of death, burns, injuries, diseases, or illnesses.

Storage Limitations

Prolonged exposure to direct light, especially sunlight, can degrade the performance properties of materials used in your protective garments.

The presence of moisture in your protective garment can promote the growth of mildew, fungus, bacteria, or other harmful substances that cause skin irritation, rashes, diseases, or illnesses, and may also reduce the performance properties of your protective garment. It is important to keep your protective garment away from contact with potential contaminants, including but not limited to, oils, solvents, acids, or alkalis. These substances can also create health hazards for wearing the protective garment and reduce the performance properties of your protective garment.

Your protective garment must not be stored at temperatures below –32°C (–25°F) or above 82°C (180°F). Prolonged storage of your protective garment to temperature extremes can reduce the performance properties of your protective garment.

Storage of your protective garments by folding can cause permanent creases which can cause loss of insulation and reduction of performance properties in the area of the crease. Instead, protective garments are best stored by placing the clothing on a blunt set of hooks or a heavy duty hanger.

Sharp objects, tools or other equipment can physically damage your protective garment and reduce the performance properties of your garment. If protective garments must be stored or transported in environments where there are items that can potentially cause physical damage, use a protective case or bag to prevent damage. In addition, remove all sharp tools or other items from the pockets of protective garments following use to avoid subsequent damage to garments.

Soiling and other substances on protective garments can lead to increased exposure and cause contamination of personal items if not segregated from personal area. If protective garments must be transported or stored inside living quarters or within the passenger compartment of personal vehicles, the protective garment must be placed in a protective case or bag to prevent cross-contamination.

WARNING

Do not store or transport your protective garment in compartments or trunks with sharp objects, tools or other equipment that could damage your protective garment. A damaged protective garment can increase your risk of death, burns, injuries, diseases, and illnesses.

Recommended Storage Area and Conditions

Store your protective garment in an area that is:

- Clean, dry and well ventilated
- Out of direct sunlight or not exposed to other sources of ultraviolet radiation (such as fluorescent lights)
- Not subject to temperature extremes
- Away from sharp objects, tools or other equipment that can physically damage garments
- Free of potential contaminants
- Equipped with blunt hooks or heavy duty hangers to hang protective garments

WARNING

Do not store your protective garment inside living quarters or with personal belongings. Do not transport your protective garment within the passenger compartment of personal vehicles. Failing to properly store and transport your protective garment can expose you and others to toxic and carcinogenic contaminants and increase the risk to you and others of death, injuries, diseases, and illnesses.

Chapter 8

Retirement and Disposal

WARNING

Do not wear your protective garment any longer than 10 years past the date the garment was manufactured. Do not wear your protective garment at any time if it should be retired and replaced earlier than 10 years past the date the garment was manufactured. Failure to retire your protective garment when needed may increase your risk of death, injuries, diseases, and illnesses.

Pursuant to OSHA regulations, your fire department or employer must determine whether or not your protective ensemble is ready for retirement and replacement. The actual service life of each protective element varies depending on the amount of use and how well it has been cleaned and maintained. NFPA 1851, 2014 edition requires that you must retire your garment if is older than 10 years past the date the garment was manufactured.

Your protective garment may require retirement earlier than 10 years. The service life of your garment depends on many factors, including, but not limited to, how you and your fire department or employer use, care for and maintain your protective garment. The frequency and conditions under which your protective garment is used will further affect the service life of your garment. The responsibility for deciding when to retire and replace your protective garments rests with your fire department or employer. This decision must be made by trained personnel working under the direct supervision of your fire department or employer.

Methods to Determine Need for Retirement

DANGER

Retire your protective garment immediately if it has been contaminated by chemical, biological, radiological, or nuclear (CBRN) terrorism agents after any confirmed exposure. Failure to do so will increase your risk of death, burns, injuries, diseases, and illnesses.

According to NFPA 1851, 2014 edition, your organization or employer must develop specific criteria for the removal of fire fighting protective garments, which include, but are not limited to, issues that are specific to garments that you are using, the manufacturer's instructions and your organization's experience with the garments.

Your protective garment must be retired if:

- Your organization or employer determines that the garment is worn or damaged to the extent that your organization or employer is unable to or it is not cost effective to provide appropriate repairs.
- The garment was not in compliance with the edition of the NFPA 1971 when it was manufactured.
- Your organization or employer determines that the garment is contaminated to the extent that your organization or employer is unable to or it is not cost effective to provide appropriate decontamination.
- Your protective garment has been contaminated by CBRN terrorism agents.

Acceptable Methods of Garment Disposal

If retired, your protective garment must be destroyed or disposed of in a manner that assures that the garment cannot be used in any fire fighting or emergency activities, including live fire training. Acceptable methods of garment disposal include, but are not limited to, cutting the clothing in pieces or stapling the clothing together in a manner in which the staples cannot be removed and the clothing cannot be worn.

If your protective garment has been retired and your organization or employer determines that the garment is not contaminated, defective or damaged, the garment may be used in training that DOES NOT INVOLVE LIVE FIRE provided that your organization or employer clearly marks on the garment that it is for training only and not for use in live fires.

DANGER

Retired protective garments are not suitable for fire fighting and emergency activities. Do not use any protective garment that has been retired for any fire fighting or emergency activity. Doing so increases your risk of death, burns, injuries, diseases, and illnesses.

Chapter 9
Special Incident Exposures

NOTE: If you are involved in fire fighting or other emergency activity where serious fire fighter injuries or fatalities occur, contact your supervisor to determine the disposition of your protective garment before using it following the incident.

Your organization or employer must have procedures in place for handling and maintaining the custody of protective garments that are directly related to serious fire fighter injuries or fatalities that include at least the following:

- Immediate removal from service and preservation of the protective garment(s) involved.
- Custody of the protective garment(s) involved in a secure location with controlled, documented access.
- Non-destructive tagging and storage of protective garment(s) in paper or cardboard containers (plastic containers must not be used).
- Examination of protective garments) by qualified members of your organization or employer, the garment manufacturer or outside experts.

Your fire department or employer must set a specific time period for how long the protective garments must be retained.

Chapter 10
Other Information

Warranty

Your protective ensemble is warranted by the manufacturer to be free from defects in material and workmanship. This warranty does not cover normal wear or unusual exposures. This warranty is in lieu of all other warranties, expressed or implied, including, but not limited to, implied warranties of marketability and/or fitness for a particular use. Repair or replacement for breach of this warranty shall be the exclusive remedy available. The manufacturer shall not be liable for incidental or consequential damages.

Replacement Guides

Keep this Official User Information Guide in a safe place and refer to it regularly. Replacement guides for your protective garment may be obtained from the manufacturer. Contact the manufacturer if you lose this guide.

Contact Information

The manufacturer contact information is provided on the garment label. If you need further information to reach a manufacturer, contact the Fire and Emergency Manufacturers and Services Association, Inc. (FEMSA) online at info@femsa.org.

References

NFPA Standards. NFPA standards may be obtained from the National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269 (800-344-3555 or 617-770-3000); standards may also be ordered on line at www.nfpa.org. Below is a sample of available NFPA standards

- NFPA 600, Standard on Industrial Fire Brigades
- NFPA 1500, Standard on Fire Department Occupational Safety and Health Program
- NFPA 1581, Standard on Fire Department Infection Control Program
- NFPA 1851, Standard on Selection, Care and Maintenance of Structural Fire Fighting Ensembles
- NFPA 1851, Standard on Selection, Care and Maintenance of Structural and Proximity Fire Fighting Protective Ensembles
- NFPA 1951, Standard on Protective Ensembles for Technical Rescue Incidents
- NFPA 1971, Standard on Protective Ensembles for Structural and Proximity Fire Fighting
- NFPA 1975, Standard on Station/Work Uniforms for Fire and Emergency Services
- NFPA 1991, Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies
- NFPA 1992, Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies
- NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents
- NFPA 1999, Standard on Protective Clothing for Emergency Medical Operations

Federal Regulations. Copies of Federal regulations may be obtained from the U.S. Government Printing Office, Washington, DC 20402 (202-512-0000). Free copies of government regulations may be obtained on line at www.gpoaccess.gov

- Title 29, Code of Federal Regulations, Section 1910.120, "Hazardous Waste Operations and Emergency Response"
- Title 29, Code of Federal Regulations, Subpart I — Personal Protective Equipment, Sections 1910.132 through 1910.140
- Title 29, Code of Federal Regulations, Section 1910.156, "Fire Brigades"
- Title 29, Code of Federal Regulations, Section 1910.1030, "Bloodborne Pathogens"

Glossary

Accessories/Accessory. An item or items that could be attached to a certified product, but are not necessary for the certified product to meet the requirements of the standard.

Advanced Cleaning. See definition of Cleaning.

Biological Terrorism Agents. Liquid or particulate agents that can consist of a biologically derived toxin or pathogen to inflict lethal or incapacitating casualties.

Body Fluids. Fluids that are produced by the body including, but not limited to, blood, semen, mucus, feces, urine, vaginal secretions, breast milk, amniotic fluids, cerebrospinal fluid, synovial fluid, and pericardial fluid.

Carcinogen/Carcinogenic. A cancer-causing substance which is identified in one of several published lists, including, but not limited to, the NIOSH Pocket Guide, Sax Hazardous Chemicals and ACGIH TLVs and Biological Indices.

Care. Procedures for cleaning, decontamination and storage of protective clothing and equipment.

CBRN. An abbreviation for chemicals, biological agents and radiological particulate hazards. (See also CBRN Terrorism Agents)

CBRN Barrier Layer. The part of the composite that is intended to provide protection against CBRN terrorism agents.

CBRN Terrorism Agents. Chemicals, biological agents and radiological particulates that could be released as the result of a terrorist attack. (See also Chemical Terrorism Agents, Biological Terrorism Agents, Radiological Particulate Terrorism Agents, Toxic Industrial Chemicals). Chemical terrorism agents include solid, liquid and gaseous chemical warfare agents and toxic industrial chemicals. Chemical warfare agents include, but are not limited to GB (Sarin), GD (Soman), HD (sulfur mustard), VX, and specific toxic industrial chemicals. Many toxic industrial chemicals, for example chlorine and ammonia, are identified as potential chemical terrorism agents because of their availability and degree of injury they could inflict.

Biological terrorism agents are bacteria, viruses or the toxins derived from biological material. The CBRN ensemble protects against biological particles dispersed as aerosols and liquid borne pathogens. Airborne biological terrorism agents could be dispersed in the form of liquid aerosols or solid aerosols, e.g., a powder of bacterial spores. Liquid borne pathogens could be encountered during a terrorism incident as a result of deliberate disposal or from body fluids released by victims of other weapons, e.g., explosives, firearms.

CBRN ensembles protect from radiological particulates dispersed as aerosols. The protection is defined for blocking or filtering airborne particulate matter, liquid and solid aerosols, but not for radiological gases or vapors. Airborne particulates have the ability to emit alpha- and beta-particles and ionizing radiation from the decay of unstable isotopes.

Certification/Certified. A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of a specific standard(s), authorizes the manufacturer to use a label on listed products that comply with the requirements of that standard(s) and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine continued compliance of labeled and listed products with the requirements of that standard(s).

Char. The formation of a brittle residue when material is exposed to thermal energy.

Chemical Terrorism Agents. Liquid, solid, gaseous, and vapor chemical warfare agents and toxic industrial chemicals used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of a terrorist attack.

Cleaning. The act of removing soils and contaminants from ensembles and elements by mechanical, chemical, thermal, or combined processes. The following terms are used in NFPA 1851, 2014 edition.

- **Advanced Cleaning.** The thorough cleaning of ensembles or elements by washing with cleaning agents. Advanced cleaning usually requires elements to be temporarily taken out of service. Examples include hand washing, machine washing and contract cleaning.
- **Contract Cleaning.** Cleaning conducted by a facility outside the organization that specializes in cleaning protective clothing.
- **Routine Cleaning.** The light cleaning of ensembles or elements performed by the end user without taking the elements out of service. Examples include brushing off dry debris, rinsing off debris with a water hose, and spot cleaning.
- **Specialized Cleaning.** Cleaning to remove hazardous materials or body fluids. This level of cleaning involves specific procedures and specialized cleaning agents and processes.

Contamination/Contaminated. The process by which ensembles and ensemble elements are exposed to hazardous materials, body fluids, or CBRN terrorism agents.

Craze. The appearance of fine cracks in the surface of helmet shell or other smooth surface of an element.

Cross Contamination. The transfer of contamination from one item to another or to the environment.

Decontamination. The act of removing contaminates from protective clothing and equipment by a physical, chemical or combined process. (See also Cleaning, Specialized Cleaning.)

Disinfectant. An agent that destroys, neutralizes or inhibits the growth of harmful biological agents.

Drag Rescue Device (DRD). A component integrated within the protective coat element to aid in the rescue of an incapacitated fire fighter. The Drag Rescue Device (DRD) is solely intended to assist in pulling or dragging an incapacitated fire fighter and is not intended for vertical rescue operations where the victim fire fighter would be raised or lowered.

Ear Covers. An interface component of the protective helmet element that provides limited protection to the helmet/coat interface area.

Elasticity. The ability of a material to return to its original form after being stretched.

Elements. See definition of Ensemble Elements.

Embrittlement. The hardening of a material that makes it susceptible to easy fracture.

Emergency Medical Operations. Delivery of emergency patient care, including patient transportation when provided, prior to arrival at a hospital or other health care facility. Patient care includes, but is not limited to, first aid, cardiopulmonary resuscitation, basic life support, and advanced life support.

Energy Absorbing System. Materials or systems used to attenuate impact energy.

Ensemble. See definitions of Structural Fire Fighting Protective Ensemble and Proximity Fire Fighting Protective Ensemble.

Ensemble Elements. The compliant products that provide protection to the upper and lower torso, arms, legs, head, hands, and feet. The Proximity Fire Fighting Protective Ensemble includes, but is not limited to, garments, helmets, shrouds, gloves, and footwear. The Structural Fire Fighting Protective Ensemble includes, but is not limited to, garments, helmets, hoods, gloves, and footwear.

Entry Fire Fighting. Extraordinarily specialized fire fighting operations that can include the activities of rescue, fire suppression and property conservation at incidents involving fires producing extreme levels of radiant, conductive and convective heat, Neither Structural nor Proximity fire fighting is considered Entry fire fighting.

Faceshield. The component of the helmet that provides limited protection to a portion of the wearer's face. Not primary eye protection.

Field Evaluation. The non-laboratory assessment of an ensemble, element, or item.

Fit. The quality, state and manner in which clothing and equipment, when worn, relates to the human body.

Flame Resistance. The property of a material whereby combustion is prevented, terminated or inhibited following the application of a flaming or nonflaming source of ignition, with or without subsequent removal of the ignition source. Flame resistance can be an inherent property of a material, or it can be imparted by specific treatment. (See also Inherent Flame Resistance.)

Functional. The ability of an element or component of an element to continue to be utilized for its intended purpose.

Gauntlet. An interface component of the protective glove element that provides limited protection to the coat/glove interface area.

Glove Wristlet. See definition of Wristlet.

Hardware. Non-fabric components of the protective clothing and equipment including, but not limited to, those made of metal or plastic.

Hazardous Materials. A substance (solid, liquid or gas) that when released is capable of creating harm to people, the environment and property. Hazardous materials are any solid, particulate, liquid, gas, aerosol, or mixture thereof that can cause harm to the human body through respiration, ingestion, skin absorption, injection, or contact.

Hazardous Materials Emergencies. Incidents involving the release or potential release of hazardous materials.

Independent Service Provider (ISP). An independent third party utilized by an organization to perform any one or any combination of advanced inspection, advanced cleaning or repair services.

Inherent Flame Resistance. Flame resistance that is derived from the essential characteristics of the fiber or polymer.

Integrity. The ability of an ensemble or element to remain intact and provide continued minimum performance.

Interface Area. An area of the body where the protective garments, helmet, gloves, footwear, or SCBA facepiece meet. Interface areas include, but are not limited to: the coat/helmet/SCBA facepiece area, the coat/trouser area, the coat/glove area, and the trouser/footwear area.

Interface Component(s). Any material, part or subassembly used in the construction of the compliant product that provides limited protection to interface areas.

Liner System. The moisture barrier and thermal barrier components as used in a garment.

Maintenance. The inspection, service and repair of protective clothing and equipment including the determination for removal from service.

Manufacturer. The entity that directs and controls any of the following: compliant product design, compliant product manufacturing or compliant product quality assurance; or the entity that assumes the liability for the compliant product or provides the warranty for the compliant product.

Melt. A response to heat by a material resulting in evidence of flowing or dripping.

Moisture Barrier. The component of an element or item that principally prevents the transfer of liquids.

NFPA. National Fire Protection Association.

Organization. The entity that provides the direct management and supervision for the emergency services personnel. Examples of organizations include, but are not limited to, fire departments, police and other law enforcement departments, rescue squads, EMS providers, and hazardous materials response teams.

OSHA. The United States Occupational Safety and Health Administration.

Outer Shell. The outermost component of an element or item not including trim, hardware, reinforcing material, pockets, wristlet material, accessories, fittings, or suspension systems.

Protective Coat. The element of the protective ensemble that provides protection to the upper torso and arms, excluding the hands and head.

Protective Coverall. The element of the protective ensemble that provides protection to the torso, arms and legs, excluding the head, hands and feet.

Protective Ensemble. Multiple elements of compliant protective clothing and equipment that when worn together provide protection from some risks, but not all risks, of emergency incident operations.

Protective Ensemble with Optional CBRN Terrorism Agent Protection. A compliant structural or proximity fire fighting protective ensemble that is also certified as an entire ensemble to meet the optional requirements for protection from specific CBRN terrorism agents.

Protective Footwear. The element of the protective ensemble that provides protection to the foot, ankle and lower leg.

Protective Garments. The coat, trouser and coverall elements of the protective ensemble.

Protective Glove. The element of the protective ensemble that provides protection to the hand and wrist.

Protective Helmet. The element of the protective ensemble that provides protection to the head.

Protective Hood. The interface element of the structural fire fighting protective ensemble that provides limited protection to the coat/helmet/SCBA facepiece interface area.

Protective Shroud. The component of the proximity fire fighting protective helmet that provides limited protection to the helmet/coat interface area.

Protective Trouser. The element of the protective ensemble that provides protection to the lower torso and legs, excluding the ankles and feet.

Proximity Fire Fighting. Specialized fire fighting operations that can include the activities of rescue, fire suppression and property conservation at incidents involving fires producing high levels of radiant heat as well as conductive and convective heat.

Radiological Particulate Terrorism Agents. Particles that emit ionizing radiation in excess of normal background levels, used to inflict lethal or incapacitating casualties, generally on a civilian population as a result of terrorist attack. This guide addresses protective ensembles that only provide partial protection from certain radiation sources. By their nature these ensembles provide protection from alpha particles, and the element materials and distance will significantly attenuate beta particles. These ensembles do not provide any protection from ionizing radiation such as gamma rays and X-rays other than to keep the actual radiological particulate from direct skin contact.

Retirement. The process of permanently removing an element from emergency operations service in the organization.

Routine Cleaning. See definition of Cleaning.

Seam. Any permanent attachment of two or more materials in a line formed by joining the separate material pieces.

- **Seam; Major A.** Outermost layer seam assemblies where rupture could reduce the protection of the garment by exposing the garment's inner layers. Outermost layer seam assemblies include outer shell seams. Rupture of the outer shell could reduce the protection of the garment by exposing inner layers such as the moisture barrier and the thermal barrier.
- **Seam; Major B.** Inner layer seam assemblies where rupture could reduce the protection of the garment by exposing the next layer of the garment, the wearer's station/work uniform, other clothing, or skin. Inner layer seam assemblies include moisture barrier and thermal barrier seams.
- **Seam; Minor.** Remaining seam assemblies that are not classified as Major A or Major B seams.

Selection. The process of determining what protective clothing and equipment (PCE) is necessary for protection of fire and emergency services response personnel from an anticipated specific hazard or other activity, the procurement of the appropriate PCE and the choice of the proper PCE for a specific hazard or activity at an emergency incident.

Separate/Separation. A material response evidenced by splitting or delaminating.

Service Life. The period for which compliant product may be useful before retirement.

Shank. The component of footwear that provides additional support to the instep.

Soiled/Soiling. The accumulation of materials, that are not considered hazardous materials, body fluids or CBRN terrorism agents, but which could degrade the performance of the ensemble or element.

Specialized Cleaning. See definition of Cleaning.

Stress Area. Those areas of the garment that are subjected to more wear, including but not limited to, crotches, knees, elbows, and shoulders.

Structural Fire Fighting. The activities of rescue, fire suppression and property conservation in buildings, enclosed structures, vehicles, marine vessels, or like properties that are involved in a fire or emergency situation.

Suspension. The energy attenuating system of the helmet that is made up of the headband and crown strap.

Tensile Strength. The force at which a fiber or fabric will break when pulled in one dimension.

Textile Fabric. A planar structure consisting of yarns or fibers.

Thermal Barrier. The component of an element or item that principally provides thermal protection.

Toxic Industrial Chemicals. Highly toxic solid, liquid or gaseous chemicals that have been identified as mass casualty threats that could be used to inflict casualties, generally on a civilian population, during a terrorist attack.

Trim. Retroreflective and fluorescent materials attached to the outermost surface of the protective ensemble for visibility enhancement. Retroreflective materials enhance nighttime visibility, and fluorescent materials enhance daytime visibility. "Trim" is also known as "visibility markings."

Universal Precautions. An approach to infection control in which human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV and other bloodborne pathogens. Under circumstances in which differentiation between body fluids is difficult or impossible, all body fluids shall be considered potentially infectious materials.

Utility Sink. A separate sink used for cleaning ensembles and ensemble elements.

Winter Liner. An optional component layer that provides added insulation against cold.

Wristlet. The interface component of the protective element or item that provides limited protection to the coat/glove interface area.

Notes

PERSONAL RESPONSIBLITY CODE

DANGER

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called on to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns, injury, diseases, and illnesses.

FEMSA

COPY OF PRODUCT LABEL

DANGER

DO NOT USE THIS GARMENT IF YOU HAVE NOT READ AND UNDERSTOOD THE ENTIRE *FEMSA OFFICIAL USER INFORMATION GUIDE* AND ALL LABELS FOR STRUCTURAL AND PROXIMITY FIRE FIGHTING PROTECTIVE GARMENT!

Fire fighting and other emergency activities where this garment may be used are ULTRA-HAZARDOUS, UNAVOIDABLY DANGEROUS activities. Neither this garment nor any other will protect you from all burns, injuries, diseases, illnesses, conditions, or hazards, any of which may cause death. No protective garment can replace proper training and constant practice in fire fighting/emergency activity tactics and safety. Consistent with OSHA regulations, you, your department or employer must conduct a hazard assessment and determine if this garment provides an acceptable level of protection for your operations in fire fighting or any emergency activity.

- You will increase your risk of DEATH, BURNS, INJURIES, DISEASES OR ILLNESSES if you do not strictly comply with the entire *FEMSA OFFICIAL USER INFORMATION GUIDE* and all LABELS. These consequences may occur with NO WARNING and NO SIGN of damage to this garment.
- Wearing this or any protective garment may increase your risk of heat stress which may cause heart attack, stroke, dehydration, or other conditions resulting in DEATH, INJURIES OR ILLNESSES.
- You may NOT feel heat under this garment before suffering a BURN, even when contacting a hot surface. This garment will lower your ability to feel heat and you may be burned underneath the garment with NO warning and NO sign of damage to the garment. Be constantly alert to the possibility of exposure to heat and other hazards.
- Do NOT use this garment if it is soiled, contaminated, torn, abraded, worn, or altered from its original condition. Do NOT use this garment unless it has been properly inspected and maintained by your fire department or employer consistent with the latest edition of NFPA 1851.
- Wear this garment ONLY with all layers and components in place and ONLY with all garment's closures (flaps, buttons, hooks, collars, etc.) secured. This garment may include special features or be part of an overall ensemble of clothing and equipment. You MUST properly deploy all features and wear ALL ensemble components consistent with the specific manufacturer instructions.
- This garment is NOT warranted to be fit for a particular purpose. Read carefully the "Warranty Information" in the *FEMSA OFFICIAL USER INFORMATION GUIDE*.

If you do not have a *FEMSA OFFICIAL USER INFORMATION GUIDE*, contact the manufacturer.

DO NOT REMOVE THIS LABEL

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