



FIREFIGHTING GARMENT  
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User Manual





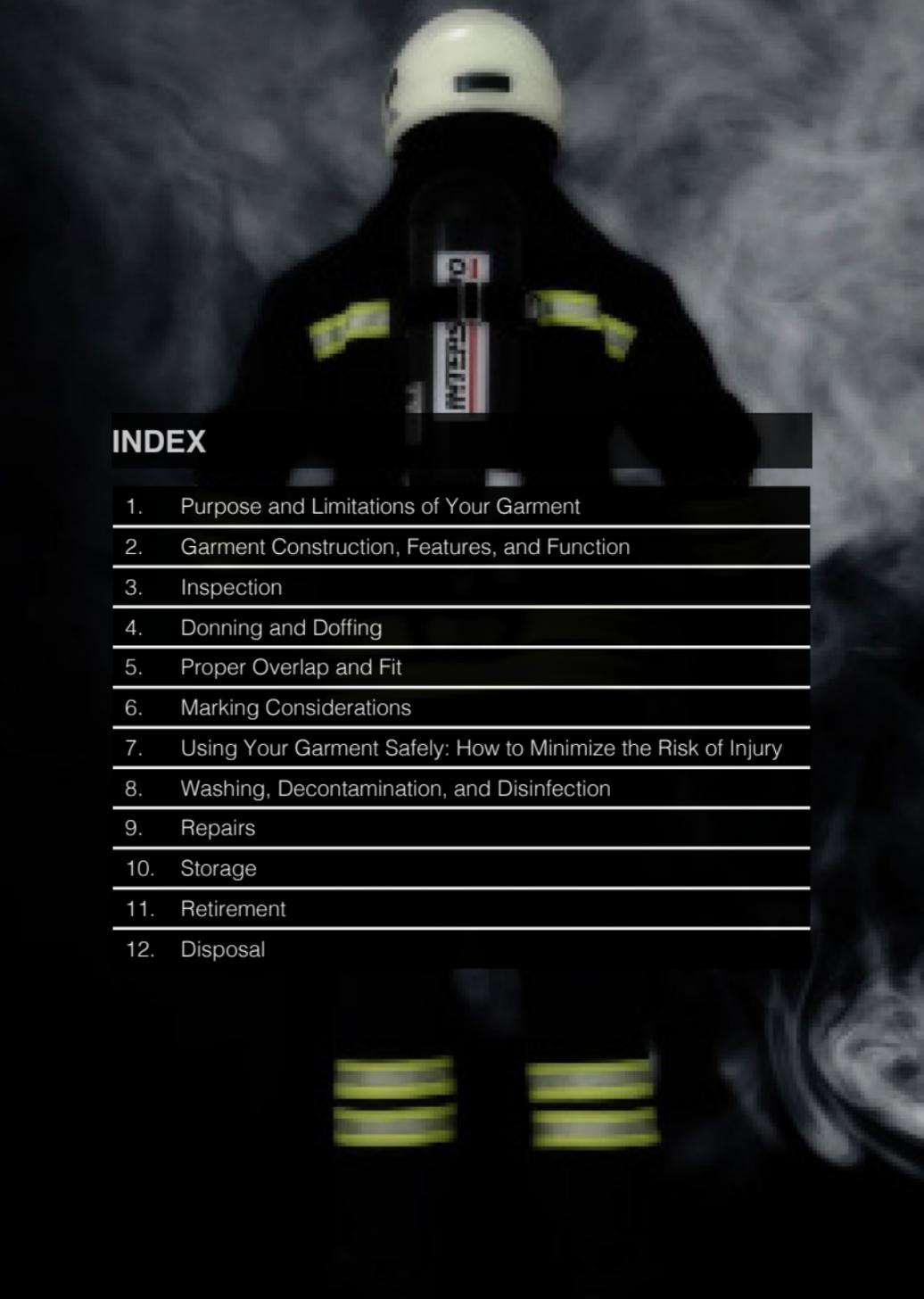


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National standards for firefighters:

EN 469 – Protective clothing for firefighters

EN 15614 – Protective clothing for wildland firefighters

EN 1486 – Protective clothing for specialised firefighters

**Look at the label of your clothing to find out the protection area.**

## 1. GARMENT CONSTRUCTION, FEATURES, AND FUNCTION

During the operations the garment is the main source of your body's protection against heat and flame, abrasion, liquid penetration.

This garment is produced in compliance with EN 469 Level 2 (Xf2, Xr2, Y2, Z2)

### 1.1. OVERVIEW

This garment helps to protect the fire fighter against heat and flame in two ways. First, it provides limited insulation from temperature extremes by creating air spaces between the layers. Second, the shell also protects you because it is made of special heat and flame resistant textiles which when exposed to fire, char instead of melt or combust, thereby reducing further injuries that can be caused by the ignition of the materials.

### 1.2. MULTI LAYERED STRUCTURE

Firefighter Garments are made with these primary layers: an outer shell, a moisture barrier, a thermal barrier and an inner lining .

**Garments should NEVER be worn without the inner layers .**

### 1.3. OUTER SHELL

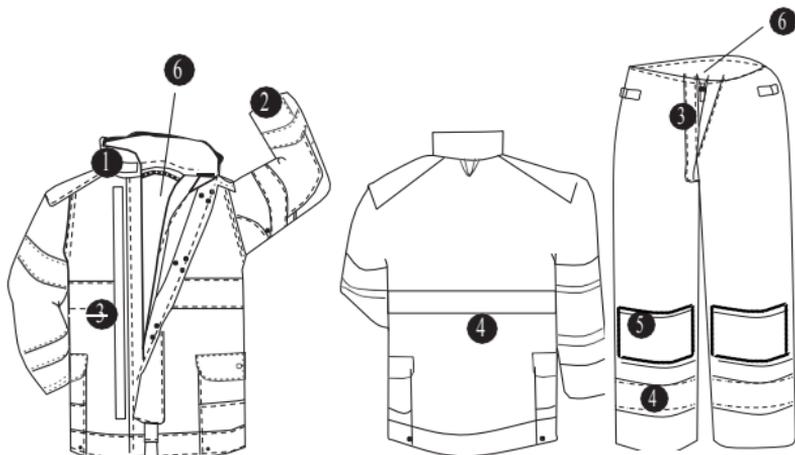
This layer is made from self-extinguishing fibers with resistance to the effects of heat, flame, and abrasion.

### 1.4. INNER LAYERS

**Moisture Barrier:** Moisture barrier is constructed of moisture-resistant yet breathable film that is laminated to a substrate for stability. It protects you and your Garment's thermal barrier from water, steam, moisture penetration. It also allows the outward passage of moisture vapor so that some of your body heat can escape.

**Thermal Barrier and Inner Lining:** Thermal barrier is constructed of flame resistant, thermally-insulative non-woven fabric that is attached to an inner lining for stability and strength. It insulates you from the effects of extreme heat encountered during structural firefighting operations.





## 1.5. OTHER IMPORTANT SAFETY FEATURES

**Collar (1) :** Your coat's collar must be raised up and secured with the hook and loop closure (with the throat tab engaged if your Garment has a throat tab) in order to provide protection from heat, flame, and other hazards.

**Cuffs (2) :** Cuffs are designed to prevent liquids and burning particles to go through in

**Closure Systems (3) :** On the front of the coat and trousers, when properly fastened, reduce the amount of water that can enter the Garment and protect you against high temperature.

**Reflective and Fluorescent Trim (4) :** Fluorescent part provides high visibility in day light, reflective part provides high visibility in darkness.

**Reinforcements (5) :** Provide important extra protection against heat and flame, cuts, and abrasion.

**Labels (6) :** Important safety, cleaning, and information labels are located inside your coat and pant

## 1. PURPOSE OF YOUR GARMENT

This Garment is designed to protect firefighters against heat and flame and can be used for firefighting operations, search & rescue operations and victim extrication.

The upper and lower body including the neck, arms to the wrists and legs to the ankles are covered by the garment. Additional protection is a must for head, hands and feet for full protection.



## DANGER



Aluminized clothes is not suitable for entry the fire area

Do not use for direct contact with flames or molten metal.



Do not use for protection against hazardous radiological agents.

Do not use for protection against hazardous biological agents.



Provides protection against chemicals which requirements of EN469 standard, but it is not suitable for against chemicals waste protection.

### 3. INSPECTION

**3.1.** Read all Safety, Cleaning, and Information Labels. If any of the labels are missing, return the Garment to the manufacturer immediately.

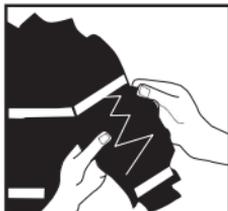


**3.2.** Inspect your Garment including its layers and other components at the following times:

- Upon receipt of your new garment or replacement component
- After each use or at least monthly (whichever is greater) during the useful life of the garment
- After exposure to heat, flames, chemicals, or fire fighting agents (including AFFF foam and water)
- After washing or repair

**3.3.** Make a table and write the methods of the inspection. Place Garment on a clean surface in a brightly lighted area.

**A) Fabric :** Examine for dirt, discoloration, thin spots, holes, tears, embrittlement, cracking, burns, abrasions, and worn spots. Grasp any part of the fabric that may be damaged or flawed in both hands, and try to push your thumbs through the fabric. If the fabric punctures, you must repair the outer shell.



**Test fabric strength  
with thumbs**

**B) Labels :** Verify that all Safety, Cleaning, and Information labels are on the Garment and are legible.

**C) Snap Fasteners :** Check snap fasteners for functionality and damage

**D) Zippers :** Examine all zippers for functionality and corrosion that would require replacement. Check stitching for loose threads that would require repair.

**E) Reinforcements :** Examine all reinforcements to make sure they are securely sewn to the garment.

**F) Cuffs :** Examine the cuffs to make sure that they fit the thumb and maintain elasticity.

**G) Metallic Parts :** Examine all metallic parts for corrosion or other damage that would require replacement.



**H) Retroreflective and Fluorescent Trim:** Inspect garment for missing, burned, loose, melted, or torn trim that has lost its retroreflective or fluorescent properties. Damaged trim must be replaced. Loose trim that maintains its reflectivity and fluorescence must be re sewn to the garment.

**I) Buckles:** Check buckles for functionality and damage

**J) Braces :** Check the braces for elasticity

#### 4. DONNING & DOFFING YOUR GARMENT

If the inner layers are replaceable, before donning, check to make sure that the inner layers and the outer shell are secured together at the torso, neck, and wrist areas on the coat, and at the torso and ankle areas on the trousers.

NEVER wear the outer shell without installing the correct inner layers; NEVER wear the inner layers without attaching the correct outer shell to it. Neither the outer shell nor the inner liner, when worn alone, provides the protection against structural fire fighting hazards.

**4.1.** With the fly closure unfastened, hold open the trousers with the suspenders hanging to the side. After pulling the trousers to the waist, fasten the fly closure securely. Cinch take-up straps, if present, so the trousers are snug at your waist. Pull the suspenders over your shoulders and adjust them so that the crotch of the trousers is comfortably secure against your crotch. Trousers that hang down too low in the crotch will dangerously restrict your mobility

**4.2.** Pull the jacket onto your body. Secure your hands through the knit wristlets and where provided, place your thumbs through the thumb holes. Pull your protective hood halfway over your head so that the bib section is under your jacket and your face is exposed. Tighten seals, if present, at the wrists by pulling the draw straps tight and locking them. Engage all fasteners to secure front closure and storm flap all the way to the neck.



### **4.3. SECURING THE COMPLETE PROTECTIVE ENSEMBLE**

**A)** When you are ready to enter the hazard area, put on your SCBA and facepiece following the manufacturer's recommended procedures for fastening and use.

**B)** Pull hood into place to cover edges of face piece. Raise the collar up and secure the hook and loop fastener and throat strap to protect your neck.

**C)** Place helmet on your head, over the hood, and use the chin strap to secure tightly to your head.

**D)** Put on protective gloves and make sure that they securely overlap the wristlet extending from the sleeves.

### **4.4. FINAL INSPECTION BEFORE ENTERING HAZARD AREA**

Last and most important, to ensure proper donning before entering a hazard area, you must have a partner inspect your interface areas for proper overlap, check your back to make sure that the rear hem is not dangerously caught in the SCBA straps, and that all closures are secured properly.

### **4.5. DOFFING (REMOVING) YOUR GARMENT**

**A)** First, never remove your garments until you are certain that you are safely removed from the hazard area. Always wear your full protective ensemble during all phases of fire suppression, including overhaul activities.

**B)** After a strenuous emergency operation is completed, and you are in a safe area, it is important to ventilate your body as quickly as possible in order to cool down. You should open the front of the coat to allow cool air to penetrate.

**C)** When you are ready to remove your Garments, you should first remove your gloves, helmet, hood, and your SCBA facepiece.

Next, you should remove your SCBA and begin to remove your Garments. Remove the coat first, then remove boots. Next, disengage fly closure on trousers and remove them.

**D)** If your Garment is dirty, you should send it to laundry.

**E)** During and after doffing, always look for signs of chemicals, body fluids, or other contamination, and for signs of wear or damage.



## 5. PROPER OVERLAP AND FIT

**5.1.** You must make sure that there is adequate overlap between the coat and the trousers, including the outer shell, the thermal liner and the moisture barrier, before using the garments. You will need the assistance of a fellow fire fighter to check these key areas.

*To check overlap, the following tests should be performed while wearing your complete protective ensemble, but without wearing SCBA:*



**Position A**



**Position B**



**Position C**

### **A) Position A**

While standing, reach over head as high as possible with your hands together. The jacket must overlap the top of the trousers

### **B) Position B**

While standing with your hands together and reaching overhead as far as possible, bend forward to the left or right, and backward. The jacket must overlap the top of the trousers

### **C) Position C**

While crawling on the knees and elbows jacket must overlap the top of the trousers

*The lower edges of your trousers must overlap the tops of your boots by 10-15 cm.*

## **5.2. CHECKING PROPER FIT**

All garments must have adequate looseness in the torso, arms, and legs to ensure that insulated air spaces are maintained.

Garments also should not be too loose, as this could hinder mobility or dexterity and place stress at the wrong places in the garments. Upon receiving new or replacement garments, make sure that there is at least a small amount of loose material around the arms and shoulder area. Then test the mobility by climbing stairs and crawling or duck walking.



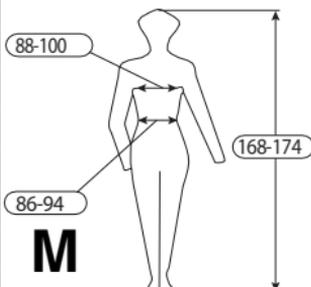
### 5.3. CHECKING THE SIZE

**Jacket :** The chest size shown for a jacket should NEVER be smaller than the circumference of your own chest, measured under your arms. Jackets are designed at least 20 cm overage for better fit over clothing. The end of the sleeve should reach beyond your wrist when arms are at rest.

**Trousers :** The waist size shown for a pair of trousers should NEVER be smaller than the circumference of your own waist, measured at your navel. The actual waist dimension of the trousers should be approximately 5-7,5 cm larger than the waist size ordered and labeled on the trousers. Make sure the lower edges of your trousers overlap the tops of your boots by 10-15 cm.

*Firefighting Garments should be produced according to below naked body sizes in compliance with EN ISO 13688.*

Size	Chest	Waist	Height
XS	72-84	70-78	160-166
S	80-92	78-86	164-170
M	88-100	86-94	168-174
L	96-108	94-102	172-178
XL	104-116	102-110	176-182
XXL	112-124	110-118	180-186
XXXL	120-132	118-126	184-190



### 6. MARKING CONSIDERATIONS

Labels should contain below information:

**6.1.** Firefighting pictogram should be as below, showing the Standard and performance level



EN 469:2005

Xf2  
Xr2  
Y2  
Z2



XXXX

**6.2.** CE sign and the notified body number of the accredited laboratory

**6.3.** Model Number



- 6.4. Content of outershell, moisture barrier, thermal barrier, inner lining
- 6.5. Warning for firefighter to wear the jacket and the trousers together
- 6.6. Washing Instruction and related pictograms
- 6.7. Information of the manufacturer company
- 6.8. Size of the garment and related pictogram

## 7. USING YOUR GARMENTS SAFELY: HOW TO MINIMIZE THE RISK OF INJURY

### 7.1. PREPARATION

Before beginning any emergency operation where there is fire or a threat of fire, your Garments should be donned according to the procedures in Section 4 of this Guide, and checked by another person for proper overlap at the interface areas.

### 7.2. FIRE CHARACTERISTICS

Fires are inherently dangerous, unpredictable environments. It is important to understand these conditions in order to maximize your protection.

### 7.3. BURN HAZARDS: TYPES OF HEAT TRANSFER

There are three types of heat transfer in a fire that could cause burns: conduction, convection, and radiation.

**Conduction :** The transfer that occurs by touching hot objects, that is, the transfer of heat directly. There is a danger of burning in this way when wear the dress. If the dress gets wet, it will transmit more heat. In the case of water evaporation, the transmission becomes more. To this end, a moisture barrier is used in the clothes. This barrier is resistant to water and does not penetrate the water to the inner layers and their porosity surface excretes the moisture caused by sweat from the inner.



**Compression against hot surfaces can cause burns**



**Convection** : Convection is the transfer of heat through a medium; for example, air. Convected heat travels through the air, even if there is no immediate appearance of fire. Convected heat can elevate the temperature of your Garment to a point at which conductive heat burns can easily occur, particularly if your garment is wet or damp.

**Thermal Radiation** : Thermal Radiation is the transfer of heat in the form of light energy into a material, directly from flames or reflected from hot objects. Factors that affect the speed of radiant heat transfer include the temperature difference between two surfaces, their distance from each other, and the reflectivity of each surface.



**Radiant heat from hot surfaces  
and flames can cause burns**

## 7.4. BURNS

Burns are a function of time and temperature. The higher the temperature of the heat source and the longer the exposure time, the greater the severity of burns.

## 7.5. HEAT STRESS

Physical work in a warm or hot environment causes a rise in the temperature inside the body. To protect the body against heat, the heart begins to beat faster so that more blood can be moved to the skin surface. Blood vessels near the skin dilate so that they can carry more blood. In this way, blood in the interior of the body can be brought out near the body's surface and cooled. When the body temperature gets elevated too high, the results can be heat strain, heat exhaustion, or heat stroke.

Overexertion in hot conditions while wearing EN 469:2005 compliant garments can lead to heat exhaustion, or heat stroke. Symptoms of heat exhaustion are a general feeling of weakness, dizziness, rapid pulse, low blood pressure while standing or sitting, and/or a headache. The skin may feel moist or clammy. If you feel symptoms, get to a cool place, remove your Garments, and drink fluids. Failure to seek attention could lead to severe coma or death.



Symptoms of heat stroke are hot, dry skin with no sweating, very high body temperatures, weakness, dizziness, rapid breathing, nausea, unconsciousness, and sometimes mental confusion. If you feel any of the above symptoms at any time, get to a cool area immediately, remove your Garments, drink fluids and seek medical attention. Failure to seek attention could lead to coma or death. Immediate cooling is essential for survival in heat stroke cases.

## **7.6. HEART ATTACKS: A RESULT OF OVEREXERTION**

During fire fighting operations, the heart beats faster because of the need to move more blood to the working muscles. This blood carries more oxygen to the muscles so that they can handle the increased workload. Another factor in increasing the rate of the heart is the presence of adrenaline, the “fight or flight” hormone, in the fire fighter’s body during an emergency. The adrenaline present in your system causes the heart to pump even faster than during normal activity.

All of these stress factors could place too much strain on the heart, leading to a heart attack. The heart simply cannot handle the load placed on it.

## **7.7. ELECTROCUTION**

Your Garment is NOT designed to protect you against electrocution. When entering a building, you should NEVER touch live wiring, especially if your Garment is wet. Never allow hoses, nozzles, or other fire equipment you are operating to contact live wiring.

# **8. WASHING, DECONTAMINATION, AND DISINFECTION**

## **8.1. HAZARDS OF DIRTY GARMENTS**

You can be exposed to many hazardous substances on the job. These substances can contaminate your Garments, and cause harm to you after your body contacts your Garments. This section tells you how to wash and decontaminate your Garments to reduce these hazards.

Many fire combustion products including hydrocarbons, polynuclear aromatic compounds, metals such as cadmium and chromium, acids and soot are hazardous to the fire fighter. These substances can become embedded in the fibers of your Garments, penetrate inner layers, and enter the body through ingestion, absorption, inhalation, and parenteral contact. In addition, particulates and other products of combustion can reduce the flame resistance of your garments and increase your garments’ ability to conduct electricity. To reduce the risk of long-term harm from hazardous substances present in the products of fire combustion, or hazardous chemicals, you MUST wash your garments.



Your Garments may be exposed to body fluids that may contain bloodborne pathogens. The washing procedures described later in this section will reduce your risk of infection from these hazards.

## **8.2. FREQUENCY**

Clean Garments at least twice a year or as soon as possible after contamination or exposure to smoke, blood or body fluids, or hazardous substances.

## **8.3. MACHINE WASHING**

Before washing, make sure you comply with all federal, state, and local guidelines for handling effluents from utility sinks.

Where provided, fasten all hooks and dees or other metal parts and turn the garment inside out or place in a large laundry bag that can be tied shut to avoid damage to the garment or to the washtub.

## **8.4. CLEANING PRODUCTS**

Never use chlorine bleach or chlorinated detergents to clean your Garments. Even small amounts of chlorine will seriously reduce your Garment's protective qualities. Non-chlorinated bleaches are acceptable. You may choose an industrial cleaning agent and must read the instructions and the label of the garment

## **8.5. MACHINE CHOICE**

Use a front loading extractor or front loading washing machine with a tumbling action for washing. Do not use a top loading machine, because it will not wash your Garments as thoroughly, and the agitator may damage the Garment and reduce its durability and protective value.

- A)** Wash temperature should not exceed 60°C
- B)** Normal Cycle
- C)** Double Rinse : Double rinsing removes residual dirt and insures detergent removal. If your machine will not automatically double rinse, a complete second rinse cycle should be run without adding detergent.

## **8.6. WASHING INSTRUCTIONS**

- A)** Load machine with Garments to be washed.
- B)** Select the appropriate washing program
- C)** All the closure systems must be closed (velcros, zippers, etc)
- D)** In case that the outershell is oily or greasy soak the garment in a washtub before machine wash



**E)** Always wash your garments separately from other items

**F)** Do not use soap

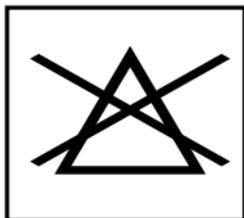
**G)** Prefer liquid cleaning agents

### 8.7. DRYING

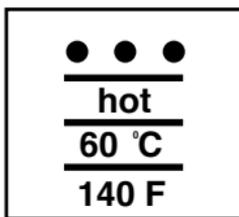
**A)** Remove Garments from washing machine and turn them inside out to expose the inner surfaces.

**B)** Do not use automatic dryers because the mechanical action and excessive heat may damage or shrink your Garments.

**C)** Dry by hanging in a shaded area that receives good cross ventilation or use a fan to circulate the air.



No chlorine bleach



water temperature



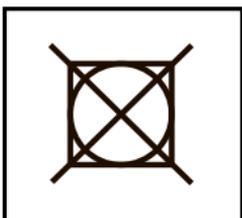
Machine wash cycle



line dry/ hang to dry



Dry in shade



Do not tumble dry



Do not dry clean



Iron at medium temperature. (Do not iron reflective strips!)



Do not wring



## 8.8. SPOT CLEANING

**Preparation:** Wear rubber gloves for the protection of hands against chemicals. If the garment's inner layers are replaceable, remove the inner layers.

**Cleaning Agents:** Liquid cleaning agents used for washing machines are also suitable for spot cleaning.

**Procedures:** Make sure water temperature does not exceed 40°C. Using a hand brush, gently scrub surfaces of inner liner and outer shell. Overscrubbing may damage your garment's materials or reduce its useful life.

**Drying:** Dry by hanging in a shaded area

## 8.9. HAZARDOUS SUBSTANCES

Stop using Garments including hazardous substances. Identification of the hazardous substances will enable the easiest cleaning. If your garment can not be decontaminated, it must be retired and disposed of

## 8.10. LAUNDRY SAFETY

Laundry and House Keeping Personnel are considered to be among those at risk to not only hazardous materials, but also to bloodborne pathogens primarily by exposure to sharp objects. Your fire department should have a Bloodborne Pathogens Written Exposure Control Plan. Part of this plan is decontamination, disinfection, and washing of Garments, and it should include LAUNDRY ROOM SAFETY PROCEDURES and HOUSEKEEPING SAFETY PROCEDURES. You should follow all appropriate federal, state, and local regulations.

## 9. REPAIRS

A damaged garment including its outer shell, inner layers or other components may be repairable, contact the manufacturer for all repairs.

## 10. STORAGE

Between runs and for longer-term storage, hang your garments out of direct and indirect sunlight and fluorescent light and away from sharp objects that may cause tears or snags in the fabric.



Use fans to provide good ventilation to dry garments that may have absorbed water or sweat after a run, and to assist in the dissipation of fire ground combustion products that may not have been removed by washing.

Failure to dry your garment will result in the growth of mildew and bacteria which could lead to skin irritation, rashes, or may affect the protective qualities of the fabrics and moisture barrier materials.

Always wash and dry your garments in accordance with the Washing Section of this Guide and before hanging in long-term storage.



**Never store your Garments in direct sunlight, indirect sunlight, or in fluorescent light.**

## 11. RETIREMENT

### USEFUL LIFE AND RETIREMENT

Useful life is the period of time that Garments that have been properly cared for can be expected to provide reasonable limited protection. Useful life is highly unlikely to be more than 7 years. A Garment should be retired when the costs of repair would exceed 50% of the replacement cost.

The useful life of a Garment will vary according to the following factors:

- Weight and type of weave of fabric
- Age and frequency of use
- Number and type of previous repairs
- Type of work the wearer performed
- The length of exposure to extreme heat, and the intensity of the heat
- The length of exposure to hazardous substances
- The length of exposure to direct or indirect sunlight, or other light sources such as fluorescent light
- Condition of the thermal liner and moisture barrier
- Garments more than 7 years old



Your Garments should be assessed at each regular inspection to determine whether it has exceeded its useful life and must be retired.

Trained professionals with in depth knowledge of garments and their limitations should handle the details of a retirement program. If you have any questions about the useful life and retirement of your Garment, get assistance before wearing your Garment into any emergency situation.

## 12. DISPOSAL

Retired uncontaminated garments must be destroyed to prevent their unauthorized or mistaken use. Cut them into several pieces and dispose of properly.

Retired Garments that are contaminated with blood or body fluids or hazardous chemicals should be placed in a plastic bag and properly disposed of.

Never use retired Garments for training purposes. Use of retired Garments in hazardous situations could result in serious injury or death.

