USER INSTRUCTION, SAFETY AND TRAINING GUIDE

LION®
ready for action

NFPA 1970 (1971) Compliant Structural Firefighter Garment

7200 POE AVE.
DAYTON, OHIO 45414
www.LIONprotects.com

April 2026



⚠ DANGER

You MUST read this Guide and all Garment Safety, Cleaning, and Information labels before wearing.

Burns are a function of time and temperature. First degree skin burns can occur when skin reaches a temperature of as low as 118° F (47.8° C).

Fire burns at temperatures up to 2000° F (1093.3° C) or higher.

This Garment provides limited protection against heat and flame in compliance with NFPA 1970 (1971). While wearing this Garment, you may be burned without heat sensation or warning in some circumstances, and without any sign of damage to the Garment.

Garment outer shell fabrics absorb flammable liquids! If splashed, immediately move to a safe location, remove Garment and send to LION TotalCare® or a verified, NFPA 1850 compliant ISP for cleaning and decontamination.

Garment Safety Label

⚠ DANGER 6150

You must read and understand these warnings and instructions.
Failure to follow these warnings and instructions will result in serious injury or death.

- Wear this garment ONLY FOR FIREFIGHTING ACTIVITIES.
- THIS GARMENT DOES NOT PROVIDE PROTECTION AGAINST CBRN TERRORISM AGENTS.
- Before wearing this garment, you must read and understand the User Instruction, Safety and Training Guide provided with this garment. The guide explains: 1. Critical safety information and protective clothing limitations. 2. Proper sizing/adjustment. 3. Procedures for putting on and removing protective clothing. 4. How to clean, decontaminate, inspect and store this garment. 5. Use consistent with NFPA 1550. 6. Limitations on useful life and retirement procedures.
- You should wear this garment only if you have been properly trained in firefighting techniques, and have knowledge of the proper selection, fit, use, care and limitations of protective clothing and equipment.

Download the User Instruction, Safety and Training Guide at www.LIONppe.com
Or contact LION @ 800-421-2626

- This garment provides limited protection against heat and flames. Minimize exposure to heat. You may be burned without warning or without receiving damage to garment. Avoid contact with hot objects. Skin burns occur when skin reaches a temperature of 118 F. Fires burn at temperatures up to 2000 F.
- Moisture and/or compression in your garment may reduce protection.
- Exertion in hot conditions may result in heat exhaustion or poor judgment. If you feel dizziness, dehydration, loss of focus, or shortness of breath, get to a safe area, remove this garment, and seek medical attention.
- Do not use this garment if it is damaged or dirty, because dirty or damaged garments will NOT provide the intended protection and may expose you to carcinogenic products of combustion. ALWAYS follow manufacturer's cleaning instructions.
- This garment has limited useful life. You must inspect regularly and retire when appropriate according to the User Instruction, Safety and Training Guide.

DO NOT REMOVE OR WRITE ON THIS LABEL! REV. 5.0 1/25

Garment Cleaning Label

LION®

Questions, write or call immediately:
LION
7200 Poe Ave., Suite 400 Dayton, OH 45414 1-800-421-2926

6484 **S**

CLEANING AND STORAGE INSTRUCTIONS

- User must clean, inspect, maintain, store and alter only in accordance with the User Instruction, Safety and Training Guide. Download at **www.LIONppe.com**
- Never use chlorine bleach. Chlorine bleach will significantly compromise the protection afforded by textile and film materials utilized in the construction of this garment.
- For coats only, remove DRD and launder DRD by hand washing with mild detergent and warm water.
- Fasten all hooks and D-rings and turn inside out or place in a laundry bag.
- Machine wash, warm water, using only liquid detergent and if needed, liquid non-chlorine bleach.
- Double rinse in cool water. Never use fabric softeners.
- Never dry clean.
- Dry by hanging in open area, out of direct or indirect sunlight and fluorescent light.
- Store out of direct or indirect sunlight and fluorescent light.

THIS STRUCTURAL FIRE FIGHTING PROTECTIVE GARMENT MEETS THE GARMENT REQUIREMENTS OF NFPA 1970, (1971), 2025 EDITION.
DO NOT REMOVE THIS LABEL.

UL CERTIFIED SAFETY US MH14967

When worn with the inner liner and outer shell assembled together, this garment meets the personal protective equipment criteria of US Dept. of Labor OSHA Bloodborne Pathogens Standard, Title 29 CFR, Part 1910, 1030, and CAL-OSHA Standard Title 8 Section 3406.

Featuring ARAFLO® Thermal Liner Fabric Layer

Rev. 5.0 1/26 **DO NOT REMOVE OR WRITE ON THIS LABEL**

Garment Information Label

LION
70% PBI/KEV SPUN 30% KEV FILAMENT
7.0 OZ/SQ YD PBI MAX
V – Force Coat

ORD: 492400
MFG: 08/2025

SIZE/TALLA: 4632R

JOB:22377300007 MODEL(0): CVBM

Serial Number: 0017128621
TAG:

Garment Liner Attachment Safety Label (examples)

⚠ WARNING

FOR COMPLIANCE WITH THE STRUCTURAL FIRE FIGHTING GARMENT REQUIREMENTS OF NFPA 1970 (1971), THE FOLLOWING PROTECTIVE ITEMS MUST BE WORN IN CONJUNCTION WITH THIS GARMENT: OUTER SHELL 6.0 OZ MINIMUM WEIGHT

This INNER LINER alone does not provide protection against heat, flame, chemical or biological hazards. NEVER wear this INNER LINER without the SAME SIZE AND MODEL OUTER SHELL, as identified on labels located on each detachable component.

To reduce the risk of injury or death, you must assemble and wear together ALL of the following items: 1. protective coat and pant with outer shell, attached inner liner and DRD installed in coat 2. gloves 3. boots 4. helmet with eye protection 5. protective hood 6. SCBA 7. PASS device. ALWAYS make sure that all ensemble layers have the proper overlap and that all items fit with adequate looseness. Tight fit lowers insulation protection and restricts mobility.

Risk of burn injury. Outer shell fabrics absorb flammable fuels and chemicals! If splashed, immediately move to a safe location, remove Garment and send to a verified ISP for cleaning and decontamination.

MADE IN THE USA www.LIONprotects.com/patents

SN DO NOT REMOVE OR WRITE ON THIS LABEL! FI 7002 REV. 2.0 1/2026

⚠ WARNING

FOR COMPLIANCE WITH THE STRUCTURAL FIRE FIGHTING GARMENT REQUIREMENTS OF NFPA 1970(1971), THE FOLLOWING PROTECTIVE ITEMS MUST BE WORN IN CONJUNCTION WITH THIS GARMENT: OUTER SHELL 6.0 OZ MINIMUM WEIGHT

This INNER LINER alone does not provide protection against heat, flame, chemical or biological hazards. NEVER wear this INNER LINER without the SAME SIZE AND MODEL OUTER SHELL, as identified on labels located on each detachable component.

To reduce the risk of injury or death, you must assemble and wear together ALL of the following items: 1. protective coat and pant with outer shell, attached inner liner and DRD installed in coat 2. gloves 3. boots 4. helmet with eye protection 5. protective hood 6. SCBA 7. PASS device ALWAYS make sure that all ensemble layers have the proper overlap and that all items fit with adequate looseness. Tight fit lowers insulation protection and restricts mobility.

ISODR® MOISTURE MANAGEMENT SYSTEM

Risk of burn injury. Outer shell fabrics absorb flammable fuels and chemicals! If splashed, immediately move to a safe location, remove Garment and send to a verified ISP for cleaning and decontamination.

MOISTURE BARRIER CONTAINS PTFE (CLASSIFIED AS PFAS)

I MADE IN THE USA www.LIONprotects.com/patents FI 6152 REV. 7.0 1/2026

DO NOT REMOVE OR WRITE ON THIS LABEL!

Drag Rescue Device (DRD) Label

⚠ WARNING

YOU MUST READ AND UNDERSTAND, SAFETY, AND TRAINING GUIDE BEFORE INSTALLATION AND USE.
This drag rescue device is designed for the immediate evacuation of an unconscious fire fighter from a hostile environment. Do not use this drag rescue device for lifting or lowering on a lifeline. When properly installed in the protective coat, all performance requirements of NFPA 1970(1971), 2025 ed are met. Do not write on or remove this label.

UL CERTIFIED SAFETY US MH14967

Questions, write or call immediately:
Lion
7200 Poe Ave., Suite 400 Dayton, OH 45414. 1-800-421-2926

LION

CHEST SIZE: LOT NO: 6486 Rev. 5.0 1/2026

Examples of labels used only in NFPA 1970 (1971) Compliant Structural Firefighter Garments

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1. INTRODUCTION

Your NFPA 1970 (1971) Compliant Structural Firefighter Garment (referred to throughout this Guide as the “NFPA 1970 (1971) Compliant Garment” or “Garment”) is designed to provide limited protection in structural firefighting operations. It and its components are manufactured and certified under the performance requirements of the NFPA 1970 (1971) Standard.

This User Instruction, Safety and Training Guide gives important instructions regarding the use, inspection, care, maintenance, storage and retirement of your Garment. Immediately upon receipt of your Garment, you should carefully read and save this Guide for future reference.

Firefighting is an extremely dangerous profession. The circumstances of each hazardous situation are unique and often impossible to predict. This Guide is a training tool to help you understand your NFPA 1970 (1971) Compliant Structural Firefighter Garment and how to use it in the safest possible manner during dangerous firefighting operations. Please take the time to read it.

For your personal safety be alert for important safety messages in this Guide:

⚠ DANGER

DANGER Indicates immediate hazards that will result in serious personal injury or death if not avoided, or if instructions, including recommended precautions, are not followed. The signal word **"DANGER"** is highlighted in red, both in this Guide and on labels affixed to your Garment, to indicate the extreme hazard of the situation.

⚠ WARNING

WARNING Indicates potentially hazardous situations that could result in serious personal injury or death if not avoided, or if instructions, including recommended precautions, are not followed. The signal word **"WARNING"** is highlighted in orange on applicable labels, and in black in this Guide.

⚠ CAUTION

CAUTION Indicates potentially hazardous situations or unsafe practices that could result in minor or moderate personal injury or product or property damage if instructions, including recommended precautions, are not followed. The signal word **"CAUTION"** is highlighted in gray in this Guide.

2. DEFINITIONS

AFFF – Aqueous Film-Forming Foam agents. A foaming agent capable of forming water-solution films on the surface of flammable hydrocarbon liquids.

ASTM – Acronym for American Society of Testing and Materials

Aramid Fibers – Specially manufactured polymer fibers in which the fiber-forming material consists of linked, long chain-like structures of large molecules. Aramid fibers exhibit higher resistance to flammability, higher strength, and higher elasticity than ordinary synthetic or natural fibers. Fabrics made from aramid fibers maintain their integrity at high temperatures and are used in protective clothing and other industrial applications.

Authority Having Jurisdiction – The organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, an installation or a procedure.

Body Substance Isolation – A concept practiced by emergency response personnel whereby blood and ALL other body fluids are considered a risk for transmission of bloodborne diseases.

Biological Agent – Biological materials that could be capable of causing disease or long-term damage to the human body.

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

Bloodborne Pathogen – Pathogenic microorganisms that are present in human blood and can cause disease in humans. These include, but are not limited to: Hepatitis B, Hepatitis C, HIV and Syphilis.

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

Body Fluids-Borne Pathogen – An infectious bacterium or virus carried in human, animal, or clinical body fluids, organs or tissue.

CBRN – An abbreviation for chemicals, biological agents and radiological particulates hazards.

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.

Component – Any material, part or subassembly used in the construction of the NFPA 1970 (1971) Compliant Garment or element of the NFPA 1970 (1971) Compliant Garment.

Composite – The layer or combination of layers of the protective ensemble, or any elements of the protective ensemble, providing the required limited protection.

DRD (Drag Rescue Device) – an integrated rescue system on the coat or coverall upper torso that, when deployed, facilitates evacuation of a downed firefighter via a dragging motion.

Emergency Medical Operations – Delivery of emergency patient care and transportation prior to arrival at a hospital or other health care facility.

Entry Firefighting – Extraordinarily specialized firefighting 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.

Exposure Incident – Specific contact of the following with blood or O.P.I.M.: 1) eye; 2) mouth or other mucous membranes; 3) non intact skin; or 4) parenteral contact.

Facecloth – Lining fabric that is used to cover inner surfaces.

Flame Resistance – The property of a material whereby the application of a flaming or non-flaming source of ignition and the subsequent removal of the ignition source results in the termination of combustion. Flame resistance can be an inherent property of the material or it can be imparted by specific treatment.

Flame Retardant – A chemical compound that can be incorporated into materials or a textile fiber during manufacture or treatment to reduce its flammability.

Flash Fire – A fire that rapidly spreads through a diffuse fuel, such as a dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure.

Fluorescence – The process by which radiant flux of certain wavelengths is absorbed and reradiated, nonthermally in other, usually longer, wavelengths.

Fluorescent Trim – Trim that absorbs and re-radiates light of certain wavelengths, making a surface highly visible to the human eye in order to provide daytime visibility.

Garment – (Also referred to as NFPA 1970 (1971) Compliant Garment.) The term Garment used throughout this Guide refers ONLY to NFPA 1970 (1971) Compliant Structural Firefighter Garments, which include the coats, trousers or coveralls. Garments are **NOT** Entry or Proximity protective clothing.

Guide – Means this User Instruction, Safety and Training Guide.

Heat Flux – The thermal intensity indicated by the amount of power per unit area. The heat flow rate through a surface of unit area perpendicular to the direction of heat flow.

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

Inner Liner – The liner portion of the NFPA 1970 (1971) Compliant Garment consisting of the thermal liner layer and the moisture barrier layer sewn together. The Inner Liner must ALWAYS be attached to the Outer Shell whenever the Garment is in service.

Interface Area – An area of the body where the protective garments, helmets, gloves, footwear, or SCBA facepiece meet. i.e., The protective coat--helmet--SCBA facepiece area, the protective coat--protective trouser area, the protective coat--protective glove area, the protective trouser--protective footwear area.

Lumbar Support – Device installed in waist of some trouser models that provides mechanical support for the back by generating inter-abdominal pressure without increasing abdominal muscle activity, reminding the wearer to exercise caution when lifting. Lumbar support is an option available in some trouser models.

Moisture Barrier – The portion of the Garment composite designed to prevent the transfer of liquids.

NFPA – Acronym for National Fire Protection Association. A private sector, volunteer-based standard-making organization in the United States that develops guidelines related to fire protection and prevention.

NFPA 1970 (1971) Compliant Structural Firefighter Garment – (Also referred to in this Guide as NFPA 1970 (1971) Compliant Garment and Garment). Means a Garment certified by a private, third party certification organization (for example, Underwriters' Laboratories) to meet at the time of manufacture the design and performance requirements of the NFPA 1970 (1971) Standards.

OPIM – Acronym for Other Potentially Infectious Materials. Includes semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, amniotic fluid, and peritoneal fluid.

OSHA – Acronym for Occupational Safety and Health Administration. A government-based standard-making body that develops public health and safety standards for the workplace.

Outer Shell – The outermost layer of the composite with the exception of trim, hardware, reinforcing material and wristlet material. Also referred to as "shell".

Parenteral – Piercing through the skin barrier, such as a needlestick injury, human bite or a cut or scrape.

PASS Device – Acronym for Personal Alert Safety Systems. A device that emits an audible signal to summon aid in the event the firefighter or emergency responder becomes disabled.

PKP or Purple-K – a common name for a dry chemical extinguishing agent based on potassium bicarbonate with a purple dye added.

Protective Ensemble (Structural) – Multiple elements of Garments and other equipment designed in accordance with the NFPA 1970 (1971) Standards to provide a limited degree of protection for firefighters from adverse exposures to the inherent risks of structural firefighting operations and certain other emergency operations. The elements of the protective ensemble are coats, trousers, coveralls, helmets, gloves, footwear, and interface components.

Protective Element – The parts or items that comprise the protective ensemble. The protective ensemble elements are: coats, trousers, coveralls, helmets, gloves, footwear and interface components.

Proximity Firefighting – Specialized firefighting operations that can include the activities of rescue, fire suppression, and property conservation at incidents involving fires producing very high levels of radiant heat, as well as conductive and convective heat such as aircraft fires, bulk flammable gas fires, and bulk flammable liquid fires. Specialized thermal protection from exposure to high levels of radiant heat, as well as thermal protection from conductive and convective heat, is necessary for persons involved in such operations. Your Structural firefighting Garments are NEVER to be used in proximity firefighting and do not provide the required level of protection. Proximity firefighting operations might be combined with structural firefighting operations. Proximity operations are performed close to the actual fire where the high levels of radiant heat as well as the convective and conductive and radiant heat would overcome the thermal protection provided by structural firefighting ensembles and the proximity firefighting protective ensembles provide enhanced protection from these thermal exposures. After the fire and heat have been controlled at a proximity firefighting incident, entry into structure or enclosures by firefighters protected by proximity firefighting ensembles could be made where the incident requires additional operations for control of the incident. The Authority Having Jurisdiction must conduct a risk assessment to determine the proper protective garments for incidents where both types of firefighting operations occur, or for proximity firefighters who may be required to provide support for structural firefighting operations.

Reinforcement – The addition of extra material for enhanced protection in areas prone to compression or abrasive wear such as knees, elbows and shoulders.

Retroreflection/Retroflective – The reflection of light in which the reflected rays are preferentially returned in the direction close to the opposite of the direction of the incident rays, with this property being maintained over wide variations of the direction of the incident rays.

Retroreflective Markings – A material that reflects and returns a relatively high proportion of light in a direction close to the direction from which it came.

RPP (Radiant Protective Performance) – A test to determine the ability of an outer shell to withstand a measured amount of radiant heat.

SAFER – Acronym for Southern Area Fire Equipment Research. An established body of fire equipment users with expertise in the research and evaluation of firefighting personal protective equipment.

SCBA – Acronym for Self-Contained Breathing Apparatus.

SDS – Acronym for Safety Data Sheets.

Sewn Seam – A series of stitches joining two or more separate pieces of material(s) of planar structure, such as textile fabrics.

Spunlace – A nonwoven fabric formed by entangling the fibers about each other in a repeating pattern.

Structural Firefighting – 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.

Thermal Barrier – The portion of the Garment composite that is designed to provide thermal protection.

TPP – Acronym for Thermal Protective Performance. A test in the NFPA 1970 (1971) Standards to determine the ability of a Garment composite to protect against a measured amount of thermal and radiant heat.

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".

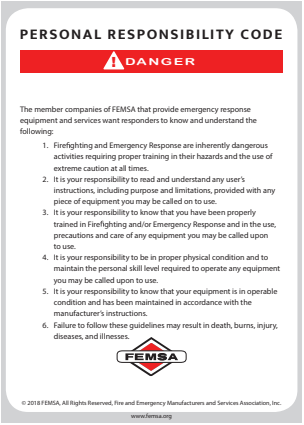
Useful Life – The period of time that NFPA 1970 (1971) Compliant Structural Firefighter Garments, which have been properly cared for, can be expected to provide reasonable limited protection. Useful life of Garments can be as little as 3 to 5 years with heavy wear and tear or improper maintenance and/or storage. Useful life can be as long as 7 to 10 years if Garments have been subject to relatively lower levels of wear and tear and have been consistently maintained in a regular cleaning and maintenance program and stored properly.

In compliance with NFPA 1850, Garments or Garment elements must be retired no more than 10 years from the date of manufacture.

UV (Light or Radiation) – Acronym for Ultraviolet Light. A type of radiated electromagnetic energy commonly found in the sun's rays.

Universal Precautions – Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other bloodborne pathogens.

Verified ISP – An Independent Service Provider that has been verified by a certification organization (such as UL or ITS) to perform moisture barrier repairs and major repairs.



PERSONAL RESPONSIBILITY 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

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www.femsa.org

FIG. 1
Personal Responsibility Code Also shown on back cover of this Guide.

3. SAFETY CHECKLIST

Do not use this NFPA 1970 (1971) Compliant Structural Firefighter Garment until you have checked "YES" to the following:

1. Have you completed formal training in structural firefighting compliant with the approved standard recognized by the Authority Having Jurisdiction, and on the proper use of structural firefighting equipment and NFPA 1970 (1971) Compliant Structural Firefighter Garments? ❑ Yes ❑ No

2. Have you read and understood all the instructions and warnings throughout this Guide as well as all the safety, cleaning and information labels on the Garment? ❑ Yes ❑ No

3. Will you regularly inspect your Garment inside and out for any tears, holes, thin spots, worn areas, color change, dirt, contaminants, leaks, embrittlement, or any other conditions discussed in Section 6 of this Guide? ❑ Yes ❑ No

4. Have you studied the limitations of your Garment as described throughout this Guide? ❑ Yes ❑ No

5. Have you checked to make sure that your Garment fits you properly in accordance with Section 8 of this Guide? ❑ Yes ❑ No

6. Have you, your safety officer, or another appropriate person made plans to ensure that your Garment is used, inspected, maintained, stored, and retired according to instructions in this Guide? ❑ Yes ❑ No

7. Do you understand that when your skin reaches a temperature as low as 118° F (47.8° C) you will be burned, and that in some situations you may not feel a heat sensation or pain while wearing your Garment or receive damage to your Garment prior to being burned? ❑ Yes ❑ No

8. Have you read, do you understand, and do you agree to assume the risks and responsibilities listed in the Personal Responsibility Code? See (**FIG. 1)** and back cover of this Guide. ❑ Yes ❑ No

If you answered **NO** to any of the questions, **DO NOT WEAR THIS GARMENT** until you have read the appropriate sections of this Guide and have been properly trained by qualified instructors.

4. PURPOSE AND LIMITATIONS OF YOUR GARMENT

This Garment is designed to provide **LIMITED** protection under the requirements of the NFPA 1970 (1971) Standard to the legs, torso, and arms against hazards arising from **STRUCTURAL** FIREFIGHTING OPERATIONS, AND NON FIRE RELATED RESCUE OPERATIONS, EMERGENCY MEDICAL OPERATIONS, AND VICTIM EXTRICATION, INCLUDING:

- Heat and flame;
- Liquid splash of six common fireground chemicals, including AFFF, battery acid, hydraulic fluid, surrogate gasoline, swimming pool chlorine (65% chlorine solution) and automobile antifreeze (see Section 10);
- Penetration of blood and other body fluids;
- Cold weather and other environmental conditions;
- Physical hazards, including cuts and abrasion; and
- Water from hose streams and other sources.

⚠ DANGER

DO NOT use this Garment for the following:

- **Proximity or Entry firefighting operations (see definitions)**
- **Activities requiring direct contact with flames or molten metal**
- **Hazardous Materials Emergency Operations**
- **Protection against all hazardous material, chemical, biological, radiological, or nuclear agents, or CBRN terrorism agents (see definitions)**
- **Wildland Firefighting**

⚠ DANGER

Firefighters who are exposed to a flashover, backdraft, or other flame and high heat environments are at **EXTREME** risk for extensive burn injuries and death even while wearing their NFPA 1970 (1971) Compliant Structural Firefighter Garments!

Emergency response personnel can encounter many common liquids during normal performance of their duties. The reference to limited protection from liquid splash from 6 common fireground chemicals should not be interpreted to mean that the Garments are suitable or are permitted to be used for protection to the wearer during any hazardous materials situation.

The moisture barrier in this Garment has not been evaluated for protection against all chemicals that can be encountered during firefighting operations. Garments that have been exposed to chemicals should be inspected in accordance with Chapter 6 of this Guide and NFPA 1850 to evaluate for any adverse effects.

⚠ WARNING

Controlled laboratory tests in the NFPA 1970 (1971) Standard “shall not be deemed as establishing performance levels for all situations to which personnel can be exposed”. You should always use extreme caution in any firefighting situation to avoid the risk of injuries. See NFPA 1970 (1971).



Do not use for proximity or entry firefighting.



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.



Do not use for protection against hazardous chemical agents.



May retain residual fireground contaminants, even after washing. Wear only when needed.

⚠ WARNING

Protective properties in a new NFPA 1970 (1971) Compliant Garment will diminish as the product is worn and ages. To reduce the risk of injuries, you MUST follow the recommendations in this Guide for inspection and retirement of your Garment to ensure that the Garment is not used past its Useful Life.

⚠ DANGER

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.

FIRST DEGREE BURNS
begin when skin temperature reaches approximately **118° F (47.8° C)**.

SECOND DEGREE BURNS
occur when skin temperature reaches approximately **131° F (55° C)**.

THIRD DEGREE BURNS
occur when skin temperature reaches approximately **152° F (66.7° C)**.

You may have **very little or no warning time** from feeling heat or pain before skin begins to burn at 118° F (47.8° C). You need to be constantly aware of the buildup of heat in the surrounding environment and in your Garment and be ready to escape to a cool area where you can remove hot Garments quickly to help prevent or reduce the severity of burns.

5. GARMENT CONSTRUCTION, FEATURES, AND FUNCTION

In order to understand the limits of protection provided by your NFPA 1970 (1971) Compliant Garment, you should study its construction, features, and function.

5.1 OVERVIEW

Your NFPA 1970 (1971) Compliant Garment helps protect the firefighter against heat and flame in three ways. First, it provides limited insulation from temperature extremes by creating air spaces between the layers. Air is the best form of insulation because heat travels through it slower than it does through most solid materials or water. 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. Third, the thickness of the fabrics also creates insulation that contributes to the limited protection against heat and flame.

5.2 LAYERED STRUCTURE

Your NFPA 1970 (1971) Compliant Structural Firefighter Garment is made with three primary layers: an outer shell, a moisture barrier, and a thermal liner. Typically, the moisture barrier and thermal liner are sewn together to make up the inner liner. This inner liner is removable for cleaning, inspection, and decontamination. **Garments should NEVER be worn without the inner liner in place.**

5.3 OUTER SHELL

Your Garment's outer shell fabric is made from self-extinguishing fibers with limited resistance to the effects of heat, flame, and abrasion. In order for the fabric to self-extinguish, you must remove it from the source of ignition. The outer shell fabrics available from different fiber and textile manufacturers have varying durability characteristics and varying resistance to fading. Outer shells made without fluorinated DWR finishes will not repel chemicals. Toxic and flammable fuels and chemicals will absorb into the fabric and create dangerous conditions for flammability and burn injury.

5.4 INNER LINER

Your Garment's inner liner consists of a moisture barrier and a thermal barrier that are typically sewn together as a unit. This inner liner fastens into the outer shell and is removable for cleaning, inspection, and decontamination. If your inner liner is the sewn-together type, it most likely has an inspection system **(FIG. 2A, FIG. 2B)** to allow easy inspection of the liner's inner surfaces. However, your Garment may have the optional Separable Liner System **(FIG. 2C)**, which is fastened together by a combination of zippers, hook and loop and snaps to facilitate inspection, cleaning, repair and/or replacement.

Moisture Barrier: Your Garment's 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 liner from water, steam, moisture penetration, chemicals and bloodborne pathogens. It also allows the outward passage of moisture vapor so some of your body heat can escape. Your Garment may have the optional Vented Moisture Barrier **(FIG. 2D)** which includes a circumferential opening with 2" overlap at the torso mid-section. Moisture barriers constructed with non-fluorinated material may have reduced durability and breathability compared to e-PTFE composites. Consult with your Authority Having Jurisdiction about changes to work protocols or guidelines.

Thermal Barrier: Your Garment's thermal barrier is constructed of layers of flame-resistant, thermally-insulative non-woven fabrics that are attached to a woven facecloth for stability and strength. It insulates you from the effects of extreme heat encountered during structural firefighting operations.

⚠ *WARNING*

Risk of burn injury. Outer shells made without fluorinated DWR finishes will not repel chemicals. Toxic and flammable fuels and chemicals will soak into the fabric and create dangerous conditions for flammability and burn injury. If splashed, immediately move to a safe location, remove Garment and send to LION Total Care or a verified ISP NFPA 1850-compliant wash facility for cleaning and decontamination.

5.5 UNDERSTANDING YOUR GARMENT SPECIFICATIONS

There are many manufacturers of outer shell, thermal liner, moisture barrier and reinforcement fabrics. Each manufacturer offers fabrics of various weights, weaves, coatings, and construction. Your Fire Department has selected a LION firefighter Garment with a combination of fabric weaves, weights, finishes, and orientations that provide a balance of NFPA-compliant



FIG. 2A: Coat Liner Inspection System (located along front facing or at collar)

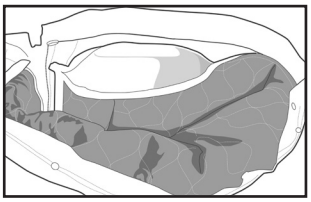


FIG. 2B: Pants Liner Inspection System (located along waistband)

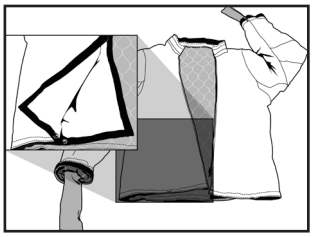


FIG. 2C: Optional Separable Liner System

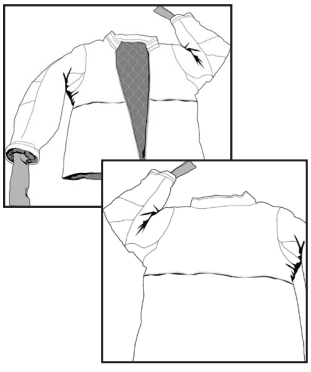


FIG. 2D: Optional Vented Moisture Barrier

performance characteristics for thermal protection, heat stress reduction, and durability. The materials selected by your Fire Department may trade breathability for additional thermal protection and durability or vice versa, as compared to another Fire Department's selection. Each Fire Department should conduct a risk assessment to guide its selection of an appropriate fabric ensemble that represents its desired balance of thermal protection, breathability, and durability. The labels inside your Garment provide information about the fabrics your Fire Department selected. Regardless of the particular configuration of fabrics, you should understand that all LION Garments meet NFPA 1970 (1971) requirements, and all LION Garments provide the level of protection, breathability, and durability represented by the fire department's combination of fabrics and construction.

5.6 DRAG RESCUE DEVICE (DRD)

Your turnout coat or coverall includes an integrated Drag Rescue Device (DRD) to provide mechanical leverage for someone to drag you from a life-threatening environment in case you become incapacitated on the fireground. The design enables the rescuer to drag you in line with the axis of your skeletal frame in order to decrease the risk of further injury.

Training should include practice locating and securing the hand loop of the DRD with gloved hands and obscured vision.

PROPER USE OF THE DRD (FIG. 3)

A. Locate hand loop access point, lift flap, and pull out the hand loop.

B. Obtain proper grip by inserting a hand through the hand loop and grasping the webbing below the loop.

C. Drag the downed firefighter across horizontal surfaces to safety.



FIG. 3
Drag Rescue Device (DRD): Proper deployment and use

5.7 RELIANT CONVERSION STRAP (RCS) (IF INCLUDED)

Your turnout pants or coverall may include an RCS to provide leverage for someone to extricate you from a life-threatening environment in case you become incapacitated on the fireground. The design enables the rescuer to drag you in line with the axis of your skeletal frame by anchoring to the SCBA straps in order to decrease the risk of further injury.

Training should include practicing locating and using the device with gloved hands and obscured vision.

⚠ WARNING

Do NOT use the Reliant Conversion Strap for lifting or lowering a person on a lifeline or for emergency escape. Using for unintended purposes may result in bodily injury or death.

PROPER USE OF THE RELIANT CONVERSION STRAP (RCS) (FIG. 4)

A. Locate pocket on pant leg where the RCS is stowed. Some designs may include a visual indicator like reflective trim to denote device location.
   a. Recommended location is on the left leg with trim on pocket flap to show location of device.

B. Open Pocket Flap and obtain proper grip of the carabiner. Pull the carabiner and fully extend the webbing from the pocket.

C. Reach across the body to the opposite side SCBA shoulder strap.

D. Secure the carabiner around the SCBA shoulder strap.
   a. Alternate attachment methods may be used such as threading the webbing under the same side shoulder strap and crossing the body to the opposite side shoulder strap or wrapping under the same leg before attachment to the SCBA

WARNING: AVOID ENTANGLEMENT OR CONNECTION TO SCBA REGULATOR

E. Locate the webbing cinch tab (can be found by reflective striping on the webbing and near the cinching mechanism)

F. Tighten the webbing until there is no slack and you meet significant resistance to tighten any further.

G. Drag the downed firefighter across horizontal surfaces to safety by pulling the SCBA straps.



FIG. 4
Reliant Conversion Strap: Proper deployment and use

To Install the RCS:

A. Remove liner from the shell

B. Don the liner only

C. Step through the RCS thigh strap (left leg recommended but this should be the same leg side as the shell welt opening)

D. Adjust the thigh strap to comfort and personal preference

E. Don the shell

F. Feed the carabiner and webbing through the welt opening on the shell, stopping at the point where the webbing meets the thigh loop

a. Note: The carabiner must be held in the open position to feed it through the welt opening.

G. If applicable to the turnout specification, wrap the internal belt loop around the hardware thigh loop adjuster to hold in place

H. Reattach your shell and liner. See 12.3

I. Stow the carabiner and webbing in the RCS pocket – fold the webbing accordion style against the carabiner and pack so carabiner is accessible at the top once the pocket flap is opened.

5.8 OTHER IMPORTANT SAFETY FEATURES (FIG. 5)

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 limited protection to the neck area from heat, flame, and other hazards.

Closure Systems: 2 On the front of the coat and trousers, when properly fastened, reduce the amount of water that can enter the Garment and prevent the coat and trousers from coming open during structural firefighting activities.

Retroreflective and Fluorescent Trim: 3 Improves visibility in low-light conditions and daytime. Exclusive to LION, perforated with holes to increase moisture vapor permeability and reduce the risk of stored energy burns.

⚠ WARNING

You must wear your NFPA 1970 (1971) Compliant Garment at all times during any emergency operation near roads or highways. The retroreflective and fluorescent trim increases the chance of being seen by motorists and decreases the probability of injury.

Reinforcements: 4 Provide important extra limited protection against heat and flame, cuts, and abrasion.

Drag Rescue Device (DRD): 5 Provides mechanical leverage for dragging a downed and incapacitated structural firefighter from a life-threatening environment.

Liner Inspection System: 6 Your Garment's inner liner has an opening through which you can visually inspect the integrity of the thermal barrier or the moisture barrier. On coat models, this system is located on the center front of the liner. However, on older models it is located along the collar interface. On pants, the system is located on the center right front of the liner near the waist.

Labels: 7 Important safety, cleaning, and information labels are located inside your coat (total of 6) and pants (total of 5):

Garment Safety Label located on the liner, provides critical safety information and directs you to read and understand this Guide.

Garment Liner Attachment Safety Label located on the liner, warns you about the need to always wear your Garment with the outer shell and inner liner attached.

Garment Cleaning/NFPA Certification Label located on the liner, explains washing, drying and storage instructions and bears the language and markings required for NFPA certification.

Garment Information Labels located on the shell inside the closure and *also* on the liner, list the Garment model, size, fabric content, date of manufacture, barcode, and serial number. Each label's barcode and serial number help you track the Garment's wash and repair history and match its shell to its liner after cleaning. The serial numbers on the shell's label and on the liner's label are identical except for the last digit: "1" for shell; "2" for liner.

DRD Label is on the DRD strap inside your coat. It provides critical safety information on your coat's Drag Rescue Device.

Optional RedZone Particulate Protection Features: 8 Core Guard, Arm Guard, Leg Guard.

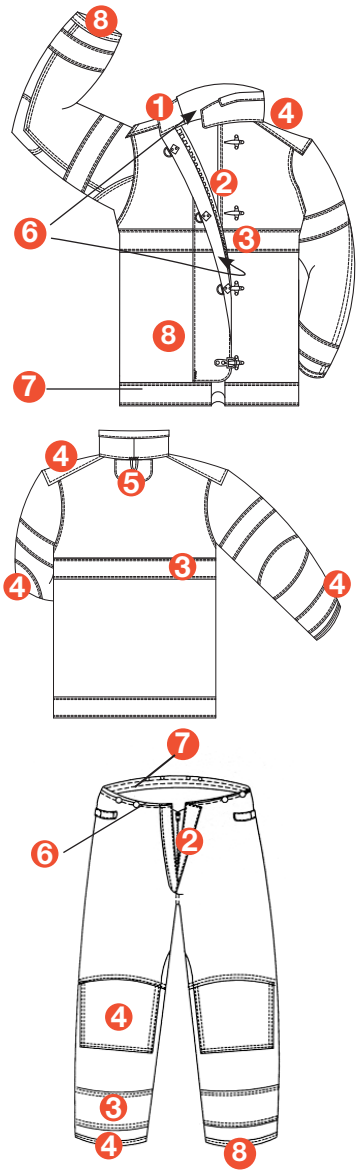


FIG. 5

Key Elements of NFPA 1970 (1971) Compliant Garments.

Samples of these labels are located on page 2 of this Guide.

6. INSPECTION

⚠ WARNING

Most performance properties of the Garment and its components cannot be tested by the user in the field.

Your Garment should be cleaned, inspected, and repaired in a frequency and manner consistent with your fire department's protocol, NFPA 1850, and NFPA 1970 (1971).

6.1 PREPARATION

Read all Safety, Cleaning, and Information Labels (See Section 5.8 of this Guide for location). If any of the labels are missing, return the Garment to the manufacturer immediately.

6.2 FREQUENCY

Routine Inspection:

Inspect your Garment including its outer shell, liner, DRD, RCS (if included) 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 firefighting agents (including AFFF foam and water);
- After exposure to body fluids (including blood); and
- After washing, repair or decontamination.

⚠ DANGER

If during firefighting operations, you perceive that water is passing through your thermal liner and moisture barrier from the outside, remove the Garment from service. Have the Garment inspected by an expert who has been trained by LION, LION TotalCare® or a verified Independent Service Provider (ISP). Passage of outside water through the liner means that the moisture barrier is damaged or deteriorated and must be replaced.

Advanced Inspection:

Your Garment should undergo a regular advanced inspection by an expert in the Fire Department who has been trained by LION, LION TotalCare® or a verified Independent Service Provider (ISP) at least annually, or whenever you have a question about whether a Garment is fit for use.

6.3 INSPECTION PROCESS AND CRITERIA

1. Preparation for Inspection

A. Ensure that Garments are clean. If any have been contaminated by hazardous materials or biological agents, make sure they have been decontaminated. This is important for your safety, and for assurance that potential problems are not masked by incidental residue.

B. Place Garment on a clean surface in a brightly lighted area.

C. Separate outer shell from inner liner. Remove DRD, RCS (if included) and suspenders.

Pay close attention to high abrasion areas such as the shoulders, back/waist area, knees, crotch, and seat. Where you see potential damage to the outer shell or thermal liner, examine the corresponding area on the moisture barrier.

2. Inspection of the DRD or RCS (where included)

A. Thoroughly inspect the DRD or RCS for chemical deterioration (discoloration); cuts or holes; pulled stitches; unusual wear; worn or frayed areas or broken fibers; and burn damage or discoloration from heat.

B. Check the RCS hardware for damage, sharp edges, and improper operation. If any is noted, or if the equipment has been subjected to other than normal use, remove the equipment from service and destroy it.

3. Inspection of the Inner Liner and Outer Shell Attachment System

A. Locate the zipper and/or snap attachments.
B. Check zipper (if present) for functionality and corrosion.
C. Disconnect and examine snaps for corrosion and make sure their attachments to the garment are secure.
D. Ensure that all snaps function well.

4. Inspection of the Outer Shell (Routine and Advanced Procedure)

A. Fabric: Examine for dirt, discoloration, thin spots, holes, tears, embrittlement, cracking, burns, abrasions, and worn spots, and liquid fuel and chemical absorption and contamination.
   a. Discoloration is a sign of overexposure to light or heat.
   b. Embrittlement, cracking or burns are a sign that other layers may be worn out or damaged and must be thoroughly inspected.
   c. Grasp any part of the fabric that may be damaged or flawed in both hands, and try to push your thumbs through the fabric. See **(FIG. 6)**. If the fabric punctures, you must repair the outer shell (if economically practical), replace it, or retire the entire Garment and dispose of it in accordance with Sections 15 and 16 of this Guide.

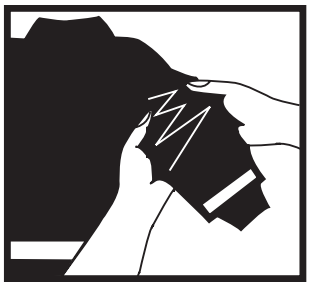


FIG. 6

Test fabric strength with thumbs

B. Closure Systems: Examine for functionality and damage.
   a. Hook and Loop – Engage and disengage hook and loop attachments to make sure they function well. Examine for worn, abraded, curled, or melted pieces that require replacement. Check stitching for loose thread that would require repair.
   b. Zippers – Examine all zippers for functionality and corrosion that would require replacement. Check stitching for loose threads that would require repair.
   c. Hardware – Examine all hardware (i.e., hooks and dees or snaps) for corrosion or other damage that would require replacement. Check that their attachment to the Garment is secure.

C. Retroreflective and Fluorescent Trim: Inspect Garment for missing, burned, loose, melted, or torn trim that has lost its retroreflective or fluorescent properties.
   a. Damaged trim must be replaced.
   b. Loose trim that maintains its reflectivity and fluorescence must be resewn to the Garment.
   c. The retroreflective properties may be evaluated by performing a flashlight test: hold a bright flashlight at eye level, either next to the temple or on the bridge of the nose, and aim the light beam at the Garment trim. Stand about 40 feet (12 meters) away. Compare reflected light from the Garment trim to a sample of new trim. If the reflected light is noticeably less than that reflected by the sample, contact LION TotalCare® or a verified ISP to repair or replace.

D. Reinforcements, Pockets, Flashlight Loops, Hanger Loops, Letters, etc: Examine all reinforcements and components to make sure they are securely sewn to the Garment. Check hook and loop or snap fasteners on pocket flaps for functionality and damage.

E. Accessories: Check all accessory items to ensure that they meet manufacturer's specifications and approval.

F. Stitching and Seams: Examine all seams for loose threads, breaks, skipped stitches, or weaknesses.

G. Labels: Verify that all Safety, Cleaning, and Information labels are on the Garment and are legible. See p. 2 and Section 5.8 of this Guide.

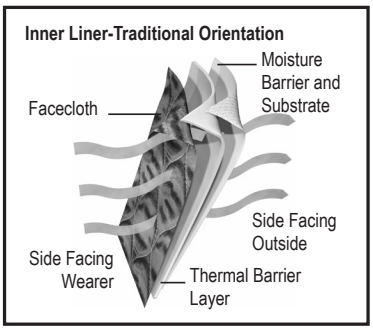


FIG. 7

Inner Liner Orientation.

5. Routine and Advanced Inspection of the Inner Liner (**FIG. 7)** for inner liner orientation.

A. Fabrics: Facecloth, Thermal Liner Layer, Moisture Barrier Layer.

Visually and manually examine each component of your inner liner for these and other signs of possible damage, such as:

- Abrasion
- Broken stitches
- Burns
- Compression
- Cracking
- Dirt
- Discoloration
- Embrittlement
- Fraying
- Holes, cuts, or tears
- Migration of fibers
- Ridges
- Rough spots
- Thin spots
- Worn spots
- Liquid fuel or chemical contamination

Give special attention to the shoulder, elbow, and knee areas that are known compression areas.

Conditions you find on any surface of the inner liner could indicate leakage or loss of thermal protection. For example:

a. Discoloration, a possible sign of overexposure to light or heat, could indicate that the fabric has become weak.

b. Embrittlement, cracking or burns on the external, visible side of the inner liner are a sign that the inside thermal liner or moisture barrier layers may no longer resist moisture or thermal loads.

B. Leakage Evaluation (Advanced inspection only)

Only the most obvious damage on moisture barriers is visible. The following leakage evaluation procedure must be performed by a trained expert during an advanced inspection. The procedure should be performed at room temperature. The procedure utilizes an alcohol-water mixture of 1 part 70% isopropanol alcohol (rubbing alcohol) with 6 parts tap water.

Leakage evaluation should be performed on:

– broadest part of shoulders

– back waist area of coats

– knees

– crotch area

– seat area

– any area where potential damage has been detected

The dry inner liner should be placed over a bucket with the thermal liner facing down. Pour 8 oz. (about 1/4 liter) of the alcohol-water mixture into a cupped area of the moisture barrier. See **(FIG. 8)**. Allow to stand 3 minutes. If the liquid passes through, the moisture barrier has been damaged, or has worn out and the inner liner should be repaired or replaced and retired.

After this procedure the liner must be washed and allowed to dry.

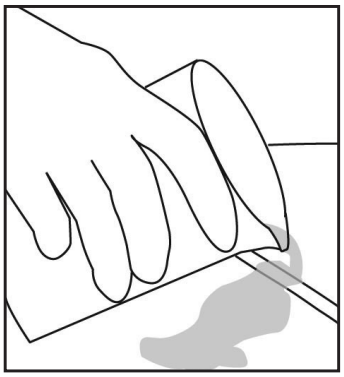


FIG. 8

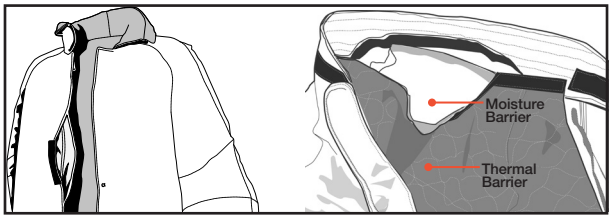


FIG. 9A: Coat Liner Inspection System

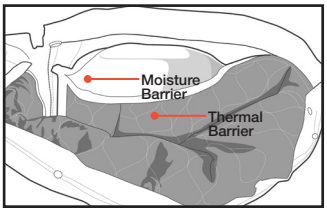


FIG. 9B: Pants Liner Inspection System

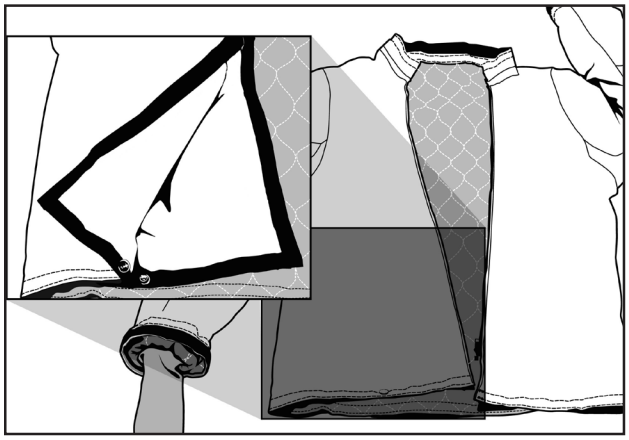


FIG. 9C
Optional Separable Liner System
The optional Separable Liner System allows you to separate the moisture barrier from the thermal liner. While you may not choose to open the liner for every routine inspection, the system allows you to more thoroughly inspect the liner components after thermal exposures. If you suspect any damage, ask a trained expert, a LION TotalCare® Center, or verified ISP to perform an advanced inspection of your Garment.

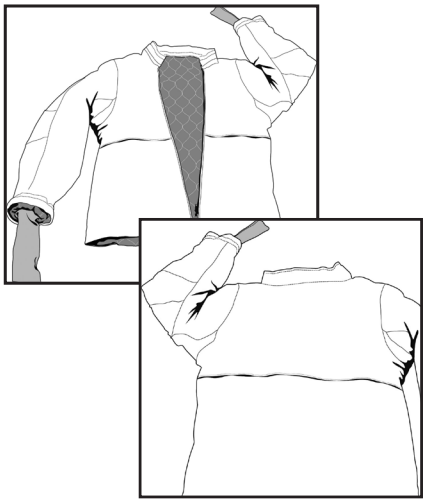


FIG. 8D: Optional Vented Moisture Barrier

If you see or feel any of signs of damage or detect anything unusual, do the following according to the type of liner that you have:

Liners with inspection systems:

- (Standard) Inspection system: **(FIG. 9A, FIG. 9B)** Reach through the opening and grasp the farthest point (such as the pants cuff, etc). Gently pull it through the opening to invert the liner.
- (Optional) Separable liner: **(FIG. 9C)** Detach hook and loop, unfasten the snaps, and separate the two layers.
- Vented moisture barrier: **(FIG. 9D)** While the chief purpose of the circumferential opening/overlap is to help dissipate excess body heat, you can examine the liner's innermost layers by looking through and/or gently inverting sections of the liner between the bartacks on the moisture barrier.

Examine (what had been) the innermost sides of the two layers for thin spots which indicate wearing away, compression, migration of fibers or other damage. If you see damage on the innermost layers, ask a trained expert to conduct a complete liner inspection.

Damage to the inside layers of the inner liner may not be visible to the user without separating the thermal liner and moisture barrier. The entire inner liner should be opened and inspected only by a trained expert, a LION TotalCare® Center, or verified ISP.

C. Wristlets: Examine protective wristlets for shrinkage, elongation of thumb holes, loss of elasticity, and seam integrity.

D. Stitching and Seams: Examine all seams for loose threads, breaks, skipped stitches, or weakness.

E. Labels: Verify that all Safety, Cleaning, and Information labels are on the Garment and are legible. See p. 2 and Section 5.8 of this Guide.

6. Complete Liner Inspection

ONLY A TRAINED EXPERT in your department, a LION TotalCare® Center, or verified ISP should separate the thermal liner from the moisture barrier and perform the following:

Preparation:

If you have a sewn-together liner with an inspection opening, reach through the opening and grasp the farthest point (such as the pants cuff, etc.). Gently pull it through the opening to invert the liner. If you have a separable liner, detach hook and loop, unzip and separate the thermal liner from the moisture barrier.

A. Thermal Liner Layer : Examine both sides for thin spots which indicate wearing away, damage of material, compression, or migration of fibers.

   a. Inspect by running hands across external surface (facecloth) and internal surface (thermal barrier) feeling for thin areas or ridges that indicate breakdown, damage, compression, or migration of fibers. Special attention should be given to the shoulder, elbow, and knee areas that are known compression areas.

B. Moisture Barrier Layer: Inspect both external surface and internal surface for any signs (holes, discoloration, rough spots, cracking, or tears) that could indicate damage or deterioration and leakage.

   a. Perform a water barrier penetration test using a hydrostatic tester on any high abrasion area and any area with suspected damage.

C. After all testing is completed, reattach the inner liner layers together, according to the type of liner:

   a. Sewn-together liner: The liner should be inverted back through the inspection opening to its normal orientation.

   b. Separable liner: Refasten the inner liner layers together.

⚠ WARNING

If you see damage on the outer surface of the inner liner, it should be inspected by a trained expert, a LION TotalCare® Center, or verified ISP to determine whether the inner layers are damaged. **In many cases, damage to the inside layers of the inner liner will not be visible to the user without an expert opening the inner liner for inspection. See inner liner advanced inspection procedures, Section 6.3 Para. 5.**

6.4 RECORDKEEPING

LION TotalCare® Centers offer recordkeeping services. For manual records, record all inspections and your results on the Inspection, Cleaning, Repair, Retirement, and Disposal Record located in the back of this Guide. Maintain this form unless your organization has provided you with a comparable record keeping method for this purpose.

7. DONNING & DOFFING YOUR GARMENT

PREPARATION: Before donning, check to make sure that the inner liner 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. It is also recommended to don your protective hood prior to coat and trousers. Next, pull your protective hood over your head and pull it entirely down around your neck so that later you can pull it up and cover your head after you don your scba facemask.



FIG. 10A

⚠ *WARNING*

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

7.1 TROUSERS



FIG. 10B

Next, don your trousers. 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. See **(FIG. 10A)**. 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 and will wear out prematurely in the crotch seams or in the fabrics of the inner liner. When properly fitted, and correctly donned, the cuffs of your trousers should be no less than 2 inches (5 cm) and not more than 5 inches (12 cm) off the floor. Step into your protective boots, and if they are adjustable, zip them up or tie the laces.

7.2 COAT



FIG. 10C

After your trousers and boots are secured, pull the coat onto your body. See **(FIG. 10B)**. 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 coat 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. See **(FIG. 10C)**. Coat models will have varying combinations of hook and loop, hooks and dee rings, snaps, or zippers.

⚠ *WARNING*

Always have a partner make sure that the rear coat hem is not bunched up in the straps of the SCBA. Failure of the rear coat hem to drape loosely across the lower body could prevent the necessary overlap and result in exposure of the lower back area to heat and flame.

7.3 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 around your head and secure the edges of the hood opening over the SCBA 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.

7.4 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.

7.5 PRELIMINARY EXPOSURE REDUCTION AFTER COMPLETION OF FIREFIGHTING OPERATIONS.

Follow NFPA 1581 requirements to remove surface contamination from your garments prior to doffing.

⚠ *WARNING*

Do not transport dirty garments in your vehicle.

7.6 DOFFING (REMOVING) YOUR GARMENT

A. First, never remove your Garments until you are certain 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.

C. When you are ready to remove your Garments, you should first remove your helmet, your hood, then your SCBA face piece and air pack. Then open coat, remove gloves and remove your coat. Avoid pulling on wristlets, when doffing coat, to prevent stretching of the knit materials.

D. Next, disengage fly closure on trousers and remove them. If you suspect the metal hook and dee ring on your fly closure is heated, use a glove to disengage the closure or ask other personnel for assistance. Then step out of boots.

E. If your Garments are contaminated with hazardous chemicals, you should remove them, carefully avoiding any contact with contaminated parts. Hose the Garments down at the scene with a low-pressure setting. Be sure to place the Garments in plastic bags to allow safe handling by laundry personnel. Follow procedures in NFPA 1850 for isolating and bagging garments. A Garment exposed to body fluids can be washed and disinfected or sanitized to reduce the risk of exposure to bloodborne pathogens. See Washing and Decontamination Procedures in Section 11 of this Guide.



FIG. 11

Emergency Doffing: Avoid compressing superheated gear and get assistance to remove it quickly.

⚠ WARNING

Firefighters who are taller than 5'8" (1.73 meters) MUST wear a coat that is 32" (81 cm) or GREATER from the back of the neck at the collar down the back to the bottom of the coat hem. Wearing a coat with improper overlap could result in serious injury. If you have questions about whether your Garments have the proper overlap, contact your nearest LION Dealer.

F. During and after doffing, always look for signs of chemicals, body fluids, or other contamination, and for signs of wear or damage. See Washing and Decontamination Procedures in Section 11 of this Guide, and Inspection Procedures, Section 6 of this Guide.

7.7 EMERGENCY DOFFING (FIG. 11)

Be aware of signs of super-heated gear such as:

1. Dye burning off that may appear to be steam or off gassing.
2. Discoloration of any PPE element

⚠ DANGER

Avoid compressing superheated gear. Compressing superheated PPE may cause steam burns. If necessary, hold arms out from your side and have another person "roll" the coat off of your arms to avoid compressing the superheated coat against your arms.

8. PROPER OVERLAP AND FIT

⚠ WARNING

Several different styles of NFPA 1970 (1971) Compliant Garments (coats and trousers) are available from LION and from various other manufacturers. You must make sure that your coat and trousers are compatible. Failure to match the proper styles of coats and pants could result in severe burns, cuts or abrasions to the lower back and torso area. If you are unsure, contact LION for more information.



FIG. 12A
NFPA Position A



FIG. 12B
NFPA Position B

8.1 OVERLAP

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 partner to check these key areas.

A Firefighter's Height Affects Overlap

Firefighters who are taller than 5'8" (1.73 meters) MUST wear a coat that is 32" (81 cm) or GREATER from the back of the neck at the collar down the back to the bottom of the coat hem. Special care should be given to long-bodied firefighters of any size to ensure that overlap requirements are met.

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

A. NFPA 1550 Standard Position A **(FIG. 12A)**. While standing, reach over head as high as possible with your hands together. The inner liner of the coat must overlap the top of the trousers by no less than 2 inches (5 cm).

B. NFPA 1550 Standard Position B **(FIG. 12B)**. While standing with your hands together and reaching overhead as far as possible, bend forward to a 90° angle, to the left or right, and backward. The inner liner of the coat must overlap the top of the trousers by no less than 2 inches (5 cm).

C. The lower edges of your trousers must overlap the tops of your boots by 4-6 inches (10-15 cm). Gloves and wristlets must overlap each other by 3 inches (7.5 cm) and leave no gaps where wrists might be exposed.

8.2 CHECKING PROPER FIT

All Garments must have adequate looseness in the torso, arms, and legs to ensure that insulated air spaces are maintained. If the Garment bunches at the shoulders or binds in the shoulders, arms, thighs or crotch area, it is probably too small. 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.

8.3 CHECKING THE SIZE

Coat. The chest size shown for a coat should NEVER be smaller than the circumference of your own chest, measured under your arms. Coats are designed with an 8-10 inches (20-25 cm) overage for better fit over clothing. For example, a "size 44" coat will be labeled as "size 44" and measure 52-54 inches (132-137 cm) around the chest depending on the coat model. 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 2-3 inches (5-8 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 4-6 inches (10-15 cm).

If the garment does not seem to fit properly, you should check the size in the label to make sure it is your size as measured, and to make sure it is your Garment.

⚠ *DANGER*

Never wear a Garment that fits improperly. If you have a question, or there is a problem with the fit of the Garment, contact your safety officer for assistance. Wearing a Garment that does not fit properly could reduce protection and result in severe burns, cuts, or abrasions, or dangerously restrict your ability to avoid injuries in an emergency situation.

8.4 PROPER FIT OF THE DRAG RESCUE DEVICE (DRD)

Before using your DRD, check to make sure that it is installed properly and that it does not bind or constrict your arms or torso or limit your ability to have a full range of motion. If you feel tightness in any way, remove your coat, check for twisting of the webbing between the shell and the inner liner, adjust the DRD, and recheck the fit to assure that the problem has been resolved.

9. MARKING CONSIDERATIONS

For marking an individual's name, or other identifying mark, an indelible laundry marker may be used. LION recommends marking the Garment in the following manner:

9.1 First, check the Garment Information Label (it has a barcode on it) to determine whether adequate identifying information was already printed by the manufacturer. If not, the under side of the coat's storm flap or under the facings at the coat front are well-protected places for individual markings. The underside of the facing at the trousers fly is also recommended.

9.2 Do not apply letters, emblems, trim, and/or other types of identification that may penetrate the moisture barrier. Do not write on the outer shell, the moisture barrier, or the substrate textile of the moisture barrier layer. Indelible inks could damage the film or coating.

NEVER MARK ON THE SAFETY, CLEANING, OR INFORMATION LABELS ON YOUR GARMENT!

Always use your NFPA 1970 (1971) Compliant Garment properly and in a manner that is consistent with NFPA 1550, *Standard on Fire Department Occupational Safety, Health and Wellness Program* and **Title 29**, *Code of Federal Regulations,* Part 1910.132, General Requirements of Subpart I, *Personal Protective Equipment.*

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

10.1 **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 7 of this Guide, and checked by a partner for proper overlap at the interface areas as described in Section 8 of this Guide.

⚠ *DANGER*

Always wear clean and thoroughly dry Garments used in any structural firefighting operation. Soiled or contaminated Garments may be combustible, causing serious burns to the wearer.

FIRE CHARACTERISTICS

10.2 Fires are inherently dangerous, unpredictable environments. **Temperatures can range upwards to more than 2000° F (1093° C) in a matter of seconds.** It is important to understand these conditions in order to maximize your protection and to understand the limited ability of your Garments to protect you from all hazards that may be present in a fire.

10.3 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 i**s the direct transfer of heat through contact with a hot object. **Convection** is the transfer of heat through a medium; for example, air. **Thermal radiation** is the transfer of heat in the form of light energy. Firefighters experience all three types of heat in a fire, and must understand their effects on NFPA 1970 (1971) Compliant Garments.

Conduction: The danger of being burned by conductive heat while wearing NFPA 1970 (1971) Compliant Garments is frequently underestimated. This very real hazard is significantly increased if your Garments are wet or compressed. Water can provide a conductive bond between surfaces that might not otherwise touch, increasing the chances of heat conduction by displacing insulating air between and within the layers of the Garments. Water is a very poor insulator; it conducts heat with dangerous and totally unpredictable efficiency!

⚠ DANGER

Moisture in Garment can reduce insulation and lead to scalding burns! Always make sure your Garment is dry before wearing it in any emergency situation. Dry your Garment between runs to reduce the risk of serious burn injuries. Inspect your Garment for holes and other damage, and always secure all the closures to prevent the penetration of moisture from the fire environment. Follow Inspection, Maintenance, Storage, Repair, Retirement, and Disposal Instructions in this Guide to make sure that the moisture barrier is not worn out or in an unsafe condition.

⚠ WARNING

Conductive burns can occur when your PPE is pulled tightly across your body, such as when you are kneeling or pulling hoseline, due to compression of the protective layers. It can also occur when your Garment is wet or damp because moisture can transfer heat much more quickly than air.

You can be burned by conductive heat when you contact heated surfaces or objects. The risk of serious conductive burns is even higher when you contact hot surfaces or objects **while compressing parts of your Garment and exposing yourself to too much heat.** Compression **(FIG. 13)** brings surfaces closer together and displaces air, resulting in the transfer of heat between outside surfaces and inner layers. For example, burns can occur on knees while crawling on hot surfaces and on shoulders where the SCBA straps have squeezed the surrounding fabric against the skin. Another common compression burn injury occurs, even without contacting a hot object or surface, when the firefighter's forearm and shoulders are exposed to the heat source while holding a hose.



FIG. 13

Compression collapses the insulating pockets of air in the layers of PPE, thereby accelerating the rate of heat transfer to your body. This is why compression against hot surfaces can cause burns.

Convection: Convective heat travels through the air, even if there is no immediate appearance of fire. Convective heat can elevate the temperature of your Garment to a point at which conductive heat burns can easily occur. Convective air can also travel into your garment's interior by entering into gaps at interface areas.

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. See **(FIG. 14).**



FIG. 14

Radiant heat from hot surfaces and flames can cause burns.

10.4 TACTICS FOR REDUCING THE RISK OF LEG BURNS

One program recently developed to reduce knee and lower leg burns is SWEEP, SWITCH, SQUAT and SHIFT:

Sweep: You should sweep the floor with the hoseline to move debris and reduce the surface temperature of the floor.

Switch: You should shift your weight from knee to knee as you advance the hoseline to reduce contact with heated surfaces.

Squat: By squatting, you are bringing the turnout gear off the floor so that it is not subject to compression burns.

⚠ WARNING

Avoid walking directly over burning objects or heat sources which may penetrate up the hem of the pants and cause burns.

⚠ WARNING

You should always make sure that the overlap between your boots and trousers is secure while fighting a fire. Prevent your trouser hems from catching on the top of your boots, which could expose your lower legs to injury.

⚠ DANGER

- You may have very little or no warning time from feeling heat or pain before skin begins to burn at 118° F (47.8° C).
- You need to be constantly aware of the buildup of heat in the surrounding environment and in your Garments and be ready to escape to a cool area where you can remove hot Garments quickly to avoid burns.

Shift: Shifting your weight from side-to-side, if you are going to be on your knees, will reduce the time your knees will be in contact with the hot surface, thereby reducing the probability that you may get compression burns through your gear.

Another technique is to kneel on your hoseline. This will help your knees off of hot surfaces for prolonged periods.

Squatting for too long can also lead to compression burns. As you squat, your turnout pants may compress against some areas of your knee and leg. Heat may penetrate faster through these compressed areas than through uncompressed parts of your protective clothing, resulting in burn injury.

⚠ DANGER

Minimize compression of your Garment at all times. Contact with hot objects can severely reduce insulation and result in scalding and burning without heat sensation or warning in some circumstances. If you feel tingling, immediately move to a cooler location. Failure to react immediately could cause you to be burned.

⚠ DANGER

Conducted, Convective or Radiant heat can penetrate quickly into your Garment. Dangerous levels of heat may be present inside or outside a structure despite the lack of flames, and burns can occur at relatively low temperatures. If you feel thermal radiation burns developing, escape to a cool, safe place immediately and remove Garment. You may be burned without any warning signals or sustaining any damage to your Garment.

10.5 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.

FIRST DEGREE BURNS begin when the temperature of skin reaches approximately **118° F (47.8° C)**.

SECOND DEGREE BURNS occur when the skin reaches approximately **131° F (55° C).**

THIRD DEGREE BURNS occur when skin temperature reaches approximately **152° F (66.7° C).**

In terms of heat flux, unprotected skin will receive a second-degree burn after only a 30-second exposure at .45 watts per square centimeter. Studies have shown that flame temperatures of low intensity wastebasket fires can reach almost 1300° F (704.4° C), with a heat flux in excess of over four watts per square centimeter, and with air temperatures ranging up to 750° F (398.9° C). Thus, even small fires can generate several times the level of heat to cause severe burns to firefighters who do not wear ALL their protective ensemble in a secure manner.

⚠ DANGER

Prolonged or repeated exposures to heat will increase Garment temperatures and can cause burns even after the firefighter is no longer exposed to high temperatures. Minimize exposure to heat by using water to cool the environment, or by escaping quickly after a short period of time. Failure to follow these instructions will result in burns beneath your Garment.

⚠ DANGER

The buildup of heat in NFPA 1970 (1971) Compliant Garments can lead to burns without any sign of damage to the Garment. Never wait for signs of Garment damage to warn of imminent burns. Always be aware of your surrounding environment and be ready to escape if you begin to feel tingling or burning sensations.

⚠ DANGER

Firefighters who are exposed to a flashover, backdraft, or other flame and high heat environments are at EXTREME risk for extensive burn injuries and death even while wearing their NFPA 1970 (1971) Compliant Structural Firefighter Garment!

⚠ WARNING

Do not confuse the component testing requirements that are part of NFPA Standards with the conditions in which firefighters work. For example, the requirement that certain components must not melt, drip, or separate when exposed to convective heat temperatures of 500° F (262° C) for 5 minutes is in no way intended to indicate that firefighters face that condition in their work, or could be expected to withstand that condition EVEN WHILE WEARING NFPA 1970 (1971) Compliant GARMENTS CORRECTLY without suffering serious injury or death.

10.6 HEAT STRESS: A SIGNIFICANT CAUSE OF FIREFIGHTER INJURIES

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 more blood can be moved to the skin surface. Blood vessels near the skin dilate so 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. Most importantly, the body produces sweat that evaporates off the skin to provide cooling. Those natural responses do not work very well for any or all of the following conditions: the ambient air temperature is at least 75° F (23.9° C) or higher, the garment's insulation blocks the transfer of heat away from the body, the garment blocks the evaporation of sweat, or the exertion of the muscles produces more heat than the system can remove. When the body temperature gets elevated too high, the results can be heat strain, heat exhaustion, or heat stroke.

⚠ WARNING

Non-fluorinated-based moisture barrier composites have lower breathability and may contribute to increased risk of heat stress than PTFE-based barriers. You should consult with your AHJ regarding appropriate changes to work protocols if your department's barrier specification has changed.

⚠ WARNING

Overexertion in hot conditions while wearing NFPA 1970 (1971) 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 coma or death.

⚠ WARNING

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.

10.7 HEART ATTACKS: A RESULT OF OVEREXERTION

During firefighting 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 firefighter’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.

⚠ WARNING

You must be physically fit to safely perform strenuous work under stressful conditions. Regular cardiovascular exercise, abstaining from cigarette smoking, proper training, a healthy diet, and avoidance of obesity, can help to reduce the risk of heart attack.

10.8 LIQUID PENETRATION AND HAZARDOUS MATERIALS

⚠ WARNING

Your Garment is not designed for use as a flotation device. Using your Garment for flotation may lead to serious injury or death.

LIMITED Protection against liquid penetration from 6 common chemicals

Your NFPA 1970 (1971) Compliant Garment’s moisture barrier is tested for resistance against penetration from liquid splash by only six common fireground chemicals after 1 hour exposures. These chemicals are 1. AFFF, 2. battery acid, 3. hydraulic fluid, 4. surrogate gasoline, 5. swimming pool chlorine (65% chlorine solution) and 6. automobile antifreeze. These liquids are tested because they are considered to be the most common chemicals encountered in structural firefighting operations. The purpose of the Garment is to provide limited protection against incidental contact with these materials encountered during routine operations.

⚠ WARNING

Over time, as the garment is worn and ages, the moisture barrier’s protection against penetration of the 6 common fireground chemicals will become more limited. See Useful Life section of this Guide, and NFPA 1970 (1971).

No Protection Against Hazardous Materials Exposure

In addition, firefighters face potential exposure to an almost unlimited number of other potentially hazardous chemicals in their operations. **Your NFPA 1970 (1971) Compliant Garment is NOT designed to protect against exposures to hazardous material operations. You MUST use appropriate protective equipment in situations involving CBRN, liquid or vapor hazardous materials.**

⚠ WARNING

Risk of burn injury. Outer shells made without fluorinated DWR finishes do not repel chemicals. Toxic and flammable fuels and chemicals will soak into the fabric and create dangerous conditions for flammability and burn injury. Avoid contact with common flammable liquids such as diesel fuel, gasoline and hydraulic fluid. If splashed, immediately move to a safe location, remove Garment and send to LION TotalCare or a verified ISP for cleaning and decontamination.

⚠ WARNING

Exposure to smoke particulates produced by combustion may affect cardiovascular health and may increase your risk of cancer. You must secure all interfaces properly to minimize entry of hazardous fireground contaminants. Even small fires produce extremely large amounts of these hazardous products of combustion and firefighters must take care to minimize direct skin contact with products of combustion that are known to penetrate skin, such as Polycyclic Aromatic Hydrocarbons (PAHs) denoted by asterisks(*). **See Products of Combustion table below.**

Products of Combustion**

Substances	
Acetaldehyde	Isoprene
Arsenic	Lead compounds, inorganic
Asbestos	Lead compounds, organic
Benz[a]anthracene*	Naphthalene*
Benzene	2-Nitroanisole
Benzo[b]fluoranthene*	Polychlorinated biphenyls
Benzo[k]fluoranthene*	Polychlorinated dibenzodioxins
Benzofuran*	Polychlorophenols
Benzo[a]pyrene*	Radioactivity
1,3-Butadiene	Silica (amorphous)
Cadmium	Sillica (crystalline)
Carbon black (total)	Styrene
Chrysene*	Sulfuric acid (concentrated mists)
Dibenz[a,h]anthracene*	Tetrachloroethylene
Dichloromethane	Toluene diisocyanates
Ethylbenzene	Trichloroethylene
Formaldehyde	Trichloromethane
Furan	Triphenylene
Indeno-1,2,3-[cd]pyrene*	

⚠ WARNING

If you experience accidental or incidental exposure to a hazardous material, you need to follow the precautions in Section 11 of this Guide regarding Washing and Decontamination, in order to limit exposure to yourself and others.

** Sources and for more information please see: Hwang, Xu, Agnew, Clifton, Malone, Health Risks of Structural Firefighters from Exposure to Polycyclic Aromatic Hydrocarbons: A Systemic Review and Meta-Analysis. 2021, 18 4209 https://doi.org/10.3390; Fent, K.W.; Eisenberg, J.; Snawder, J.; Sammons, D.; Pleil, J.D.; Stiegel, M.A.; Mueller, C.; Horn, G.P.; Dalton, J. Systemic exposure to pahs and benzene in firefighters suppressing controlled structure fires. Ann. Occup. Hyg. 2014, 58, 830–845. International Journal of Environmental Research and Public Health. Fent, K.W.; Eisenberg, J.; Evans, D.; Striley, C.; Snawder, J.; Mueller, C.; Pleil, J.; Stiegel, M.; Horn, G.P. Evaluation of Dermal Exposure to Polycyclic Aromatic Hydrocarbons in Fire Fighters: Report No. 2010-0156-3196, NIOSH Health Hazard Evaluation Program. 2013. Available online: https://www.cdc.gov/niosh/hhe/reports/pdfs/2010-0156-3196.pdf. Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 98, Painting, Firefighting, and Shiftwork; IARC: Lyon, France, 2010.

10.9 ELECTROCUTION

⚠ *WARNING*

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.

10.10 BLOODBORNE PATHOGENS

Your Garment is designed to protect your body from the hazards of exposure to bloodborne pathogens present in body fluids. Exposure incidents are specific contact of the following with blood or OPIM (Other Potentially Infectious Materials): eye; mouth or other mucous membranes; non-intact skin; or parenteral contact. Make sure face, mouth, eyes, nose, and non-intact skin are covered. Avoid contact with hypodermic needles and other sharp objects. Use Body Substance Isolation Procedures when handling Garments exposed to body fluids. Washing Garments according to the Procedures in Section 11 of this Guide will generally eliminate hazards of exposure to body fluids arising from incidental contact. For heavier levels of exposure, disinfecting or sanitizing Garments will substantially reduce hazards arising from exposure of Garments to potentially hazardous body fluids. See Section 11 of this Guide for more information.

10.11 ADDITIONAL FACTORS AFFECTING SAFETY

The following additional factors may affect the limited protection provided by the Garment:

- Conditions on the fireground or other site of emergency operations that are beyond the scope of the limited purposes of this Garment;
- Unauthorized modifications, repairs or replacement of components of the Garment not otherwise in compliance with LION's specifications; and
- The addition of accessories that are not approved by LION as compatible with NFPA 1970 (1971) Compliant Garments. If you have questions about whether accessories will degrade the performance of your Garment below the NFPA 1970 (1971) Standards, contact LION or a LION TotalCare® Center or a verified ISP.

11. WASHING AND DECONTAMINATION

11.1 HAZARDS OF DIRTY GARMENTS: WHY WASHING AND DECONTAMINATING IS IMPORTANT

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.

Routine Fireground Contaminants: Many fire combustion products — including hydrocarbons, polynuclear aromatic compounds, metals such as cadmium and chromium, acids and soot — are hazardous to the firefighter (see Fig. 15). These substances can become embedded in the fibers of your Garments, penetrate inner layers, and enter the body through absorption, inhalation, parenteral contact and ingestion. 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. ALWAYS wash hands thoroughly after handling or cleaning protective equipment.

Hazardous Chemicals: If you experience accidental or incidental exposure to a hazardous chemical, follow all precautions in this Section to limit exposure and risk of harm to yourself and others.

You should hose down contaminated Garments at the scene to limit further exposure to hazardous chemicals, to reduce exposure to others, and to prevent chemicals from settling into your Garments.

⚠ WARNING

Some contamination may remain even after decontamination procedures and cleaning processes are used. Decontamination and cleaning does not guarantee that protective clothing and equipment will be 100% free of contaminants. See NFPA 1850.

Bloodborne Pathogens: 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.

11.2 FREQUENCY

Clean Garments at least two times annually or as soon as possible after exposure to products of combustion, as well as contamination or exposure to smoke, blood or body fluids, or hazardous substances.

⚠ WARNING

Outer shell fabrics made since 2021 without fluorinated DWR finishes will not repel chemicals and fuels and present a risk of absorbing toxic fuels and combustible products. Special care should be taken to ensure that outer shell fabrics are cleaned regularly to minimize exposure to toxic, flammable, and carcinogenic substances.

⚠ WARNING

Always wash your Garments separately from other items. Never wash your Garments at home or at public laundry facilities to avoid the spread of chemical contamination or hazardous combustion products to other laundry.

⚠ WARNING

Never use high velocity power washers or pressure hoses for washing Garments. These tools can severely damage the raw materials and seams.

⚠ DANGER

Always clean and thoroughly dry Garments used in any structural firefighting operation. Soiled or contaminated Garments may be combustible, causing serious burns to the wearer.

⚠ WARNING

To reduce the risk of harm from hazardous substances present in the products of fire combustion, or hazardous chemicals, you MUST wash your Garments.

⚠ WARNING

Hazardous fire scene substances and chemicals may penetrate and become absorbed in your Garments. These substances can enter the body through absorption, inhalation, parenteral contact and ingestion. Wipe skin areas near the interfaces of protective clothing and equipment with a wet wipe immediately after doffing. Take a soap and water shower within 1 hour of an incident where an exposure could have occurred.

Reference NFPA 1550, section 14.5.3.1



StationCare 1850 is available online at www.lionprotects.com/totalcare.

11.3 CLEANING PRODUCTS

A. Commercially available detergents. Use commercially available detergents with a pH greater than 6.0 and less than 9.5. Many household detergents fall within this range.

B. Specialty Cleaners. StationCare 1851 from LION TotalCare® is designed for NFPA 1970 (1971) Garments. Always read SDS before use.

C. Spot cleaning and pre-treating. Use commercially available detergents with a pH greater than 6.0 and less than 9.0. Always check SDS and product's instructions before use.

⚠ WARNING

Never use chlorine bleach or chlorinated products to clean your Garments. Even small amounts of chlorine will seriously reduce your Garment's protective qualities. Non-chlorinated bleaches are acceptable.

Contact LION or a LION TotalCare® Center for additional information about the compatibility of cleaning products with protective clothing.

11.4 SPOT CLEANING

A. Use a cleaning product that is safe for use on protective clothing fabrics to clean light spots and stains on Garments.

B. Apply the cleaner one or two times on soiled areas according to the cleaning product's instructions on dilution and application. See Section 11.4 for guidelines on cleaning products.

C. For outer shells only, use a soft bristle brush (toothbrush or fingernail-type brush dipped in water) to gently scrub the soiled area for 1 or 2 minutes. For inner liner materials, gently rub the fabrics together.

D. Thoroughly and carefully rinse Garment with cool water.

⚠ WARNING

Do not use petroleum-based solvents to spot clean. These products may reduce the limited protective qualities of the Garment.

11.5 PRETREATING

A. Apply pretreating product onto the soiled areas according to the pretreating product's instructions on dilution and application.

B. Thoroughly and carefully rinse the Garment with cool water.

C. Place Garment into washing machine and follow the wash procedures in this section.



no chlorine bleach

11.6 HEAVILY SOILED AREAS

A. Air dry Garment before applying cleaning product.

B. Saturate the heavily soiled and surrounding area according to the cleaning product's instructions on dilution and application. Follow the cleaning product instructions for duration of soaking.

C. For outer shells only, use a soft bristle brush (toothbrush or fingernail-type brush dipped in water) to gently scrub the soiled area for 1 or 2 minutes. For inner liner materials, gently rub the fabrics together.

D. Thoroughly and carefully rinse Garment with cool water.

E. Repeat steps B-D if necessary.

F. Place Garment into the washing machine as instructed in the wash procedures in this Section.

11.7 MACHINE WASHING

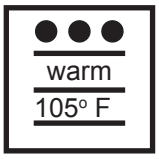
Preparation

Preparation Before washing, make sure you comply with all federal, state, and local guidelines for handling effluents from utility sinks. ALWAYS wash shells, liners, DRD, RCS and suspenders separately to avoid redepositing soil from one component to the other.

A. Detach outer shells from the inner liners. Remove DRD, RCS or suspenders. Hold the pants suspender button when removing suspender clips to extend the wearlife of the suspender button. Twist snaps to loosen when removing the liner system to extend their wearlife.
B. Hand wash DRD, RCS and suspenders with a mild detergent and soft bristle brush, rinse thoroughly, and hang the DRD, RCS and suspenders to air dry AWAY FROM DIRECT OR INDIRECT SUNLIGHT, FLUORESCENT LIGHT OR SHARP OBJECTS. See Section 11.4 for guidelines on cleaning products.
C. Pretreat heavily soiled Garments following steps in the Spot cleaning and Pretreating procedures, in Sections 11.5-11.7 of this Guide.
D. 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 wash tub.
E. Fasten all hook and loop closures to each other to reduce the likelihood of damage to delicate parts of your Garments.
F. Wash shells and liners separately to avoid possible damage to the liner caused by hardware and to avoid cross contamination.

Machine Settings

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.



water temperature



machine wash cycle

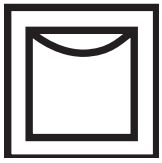

no chlorine bleach

Use the following machine settings:

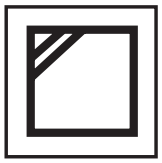
A. Wash temperature should not exceed 105° F (40° C).
B. Normal Cycle.
C. Use low extractor speeds less than 100 g's.
D. Double Rinse Double rinsing removes residual dirt and insures detergent removal. If your machine will not automatically double rinse, a complete second rinse cycle should be run without adding detergent.

Wash Procedures

A. Load machine with Garments to be washed. Follow machine manufacturer's instructions for proper load size. Overloading the machine can lead to incomplete cleaning and other poor cleaning results.
B. Add cleaning product per manufacturer's instructions. Never use Chlorine bleach; non-chlorine bleach may be used. Ensure accurate measuring tools are used for correct amount of cleaning product. See Section 11.4 for guidelines on cleaning products.
C. Set washing machine on normal cycle and start the wash cycle.



line dry/
hang to dry



in the shade



never
tumble dry



never
dry-clean

⚠ WARNING

Never Dry-Clean your Garment. Many Garment components will not function if dry-cleaned.

⚠ WARNING

Only a trained expert in decontamination should attempt to decontaminate Garments. Contact a LION TotalCare® Center or verified ISP to seek assistance in determining whether decontamination is possible, and the name of the appropriate organization to perform decontamination.

11.8 DRYING

A. Remove Garments from washing machine, and if they are not already inside out from washing, turn them inside out to expose the inner surfaces. Dry by hanging in a shaded area that receives good cross ventilation or use a fan to circulate the air.

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

⚠ WARNING

Do not hang Garments to dry in direct or indirect sunlight, or in fluorescent light. Light will severely reduce the strength of the seams, and will discolor and greatly reduce the strength and protective qualities of the components of the Garments.

11.9 DO NOT DRY CLEAN

Never dry-clean your Garment. Dry-cleaning will damage the Garment and reduce its protective qualities.

11.10 CONTRACT CLEANING

LION recommends that only a LION TotalCare® Center or verified ISP be used for contract cleaning.

11.11 HAND WASHING IN A UTILITY SINK

LION does **NOT RECOMMEND** this method for washing your Garments. However, if no other options are available, hand washing is preferable to no washing.

Preparation: Before washing, make sure you comply with all federal, state, and local guidelines for handling effluents from utility sinks. Wear rubber gloves to protect against exposure to contaminants. Detach inner liner from outer shell as indicated in the machine washing instructions.

Cleaning Products: Use same cleaning products as used for machine washing.

Procedures: Make sure water temperature does not exceed 105° F (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: See Section 11.9 for drying procedure.

11.12 DO NOT BRUSH WASH ON FLOOR OF STATION

LION does **NOT RECOMMEND** brush washing your Garment on the floor of the station because this method is not effective and may damage it.

11.13 DECONTAMINATION, DISINFECTION AND SANITIZATION

Applicable Standard. You must read and have facilities and procedures in compliance with NFPA 1581 Standard for Fire Department Infection Control Program.

⚠ WARNING

To reduce risk of harm from hazardous substances present in products of fire combustion, hazardous chemicals, and body fluids, you MUST wash, decontaminate and/or disinfect or sanitize your Garments after each exposure to such hazardous substances.

Preparation: Remove contaminated and infected Garments from wearer and from service before beginning. Garments should remain out of service until decontaminated and disinfected or sanitized. Wear protective gloves and appropriate protective clothing and equipment while decontaminating and disinfecting or sanitizing.

A. Hazardous Substances Present in the Products of Fire Combustion (Soot, Smoke, and Debris).

To reduce the risks associated with exposure to the hazardous substances found in the products of fire combustion, you MUST wash, dry, and store your garments according to the procedures in this section.

B. Hazardous Chemicals

1. Hose down contaminated Garments at the scene, using preliminary exposure reduction techniques, to limit further exposure to hazardous chemicals, to limit exposure to others, and to limit chemicals from settling into your Garments.

2. KNOWN MATERIALS: Contact the source of the materials, your local HAZMAT Team, or the Health Department to determine whether the contaminants are hazardous materials. If the contaminant is known, contact a LION TotalCare® Center or verified ISP to determine the feasibility of decontamination.

3. UNKNOWN MATERIALS: If the contaminant is not known, Garments should remain out of service until the materials are identified. Always demand SDS information and be prepared to share your findings with the LION TotalCare® Center or verified ISP to decontaminate the Garments. **If your Garment cannot be decontaminated, it must be retired and disposed of in accordance with federal, state, and local regulations.**

If you have questions concerning the use of a particular disinfectant or sanitizer, contact LION, a LION TotalCare® Center, or verified ISP.

C. Blood and Body Fluids

1. **Disinfecting or Sanitizing Products.** You must use disinfectants and sanitizers that are compatible with NFPA 1970 (1971) Compliant Garments and are compliant with NFPA 1850.

2. **Disinfecting or Sanitizing Procedures for Blood and Body Fluids**

   Small incidental areas: Use spot cleaning procedures described in Section 11.5, and use an appropriate disinfectant or sanitizer available for Garments. Always follow the instructions of the manufacturer regarding product usage. Wash Garments thoroughly after spot cleaning in accordance with procedures in this section.

   Large areas: If Garments have large areas of coverage of blood or body fluids, place and transport Garments in bags to prevent leakage. Contact a LION TotalCare® Center or verified ISP to arrange for disinfection or sanitization.

⚠ CAUTION

Personnel involved in the handling, sorting, bagging, transporting, and laundering of contaminated Garments must wear utility gloves and appropriate protective clothing to prevent occupational exposure during these activities.

11.14 LAUNDRY SAFETY

Laundry and Housekeeping 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, sanitization 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.

12. REASSEMBLY

Your Garment was completely assembled at the factory with an outer shell, liner, a DRD (coats and coveralls), and other components. However you may wish to separate your shell, liner, and DRD for inspection, washing, decontamination, or repairs. This section tells you how to put your Garment back together.


FIG. 15A


FIG. 15B


FIG. 15C


FIG. 15D


FIG. 15E

12.1 COATS

A. Start with coat shell and liner separated.

B. Orient the coat exterior side down so that the inner surface of the shell is facing you. Attach the coat shell collar to the coat liner collar and fold the liner up over the top of the shell. See **(FIG. 15A).**

C. Lay DRD on shell with hook fastener on hand loop facing down. See **(FIG. 15B).**

D. Insert hand loop into welt opening and push through the opening.

E. Insert DRD through shoulder loops and engage hook and loop. See **(FIG. 15C).**

F. Fold liner down over shell. See **(FIG. 15D).**

G. Put the liner sleeves through the larger torso loop of the DRD.

H. Insert liner sleeves into shell, carefully avoiding any twisting or bunching. See **(FIG. 15E).**

I. Fasten the wrists of the liner to the wrists of the shell beginning with the guide snap then securing the hook and loop.

J. At the lower back area of shell, press the hook material on the DRD onto the corresponding loop piece on the shell. Starting on either side, follow webbing around shoulder and down to the back to remove any twists. Repeat for other side. When done properly, the label faces outward and the hook fastener on the DRD faces the shell. This hook and loop fastener tab eliminates twisting or drooping of the DRD below the liner while donning and doffing the coat.

K. Bend 2 inches (5 cm) of the hand loop over into the welt opening on the outside of the coat shell and mate the loop fastener on the hand loop with the corresponding hook fastener on the coat shell. Pull the flap down and press into position over the hand loop.

L. Fasten the left and right fronts of the liner to their counterparts in the coat's left and right front facings.

M. Try on coat to check for comfort and proper fit.

12.2 DRD STOWAGE

A. After each deployment, inspection, or cleaning, you must reset the hand loop inside of the coat. You may secure the tip of the DRD hand loop either in the "stowed" position or in the "ready" position as shown.


DRD "Stowed"


DRD "Ready"

B. While stowed in the coat, you should regularly check the DRD to ensure that the DRD is in proper position between the shell and liner, it is not twisted and that the hand loop is securely fastened in either the "stowed" or "ready" position. See Section 12.1, step "J".

12.3 PANTS

A. Start with the pants shell and liner separated.
B. If your pants are equipped with an RCS see Section 5.7 for reinstallation
C. Insert liner legs into shell, carefully avoiding any twisting or bunching of the legs or torso.
D. Fasten the waist of the liner to the waist of the shell.
E. Fasten the cuffs of the liner to the cuffs of the shell with the guide snaps.
F. Reattach suspenders. Hold suspender buttons when reattaching suspender clips.
G. Try on pants to check for comfort and proper fit.

13. REPAIRS

To inquire on whether a damaged Garment including its outer shell, liner, DRD or other component may be repairable, contact a LION TotalCare® Center or verified ISP. REPAIRS SHOULD ONLY BE MADE BY LION TotalCare® OR BY A VERIFIED ISP.

⚠ *WARNING*

Before any repairs are made to your NFPA 1970 (1971) Compliant Structural Firefighter Garment, it must be washed, decontaminated, and disinfected or sanitized in accordance with this Guide to protect workers who alter or repair Garments from exposure to soils and contaminants.

All major repairs to Garments should be done by LION TotalCare® or a verified ISP. Major repairs made by any other entity invalidates all warranties and may expose the wearer to hazardous or life threatening conditions.

For a list of LION TotalCare® Centers, visit www.lionprotects.com/totalcare-locations. Call LION at (800) 421-2926 for an updated list of verified ISPs.

14. STORAGE

Between runs and for longer-term storage, hang your Garments, including its liner, DRD, and other components in a dry location out of direct and indirect sunlight and fluorescent light and away from sharp objects that may cause tears or snags in the fabric. See (**FIG. 16).**

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 fireground combustion products that may not have been removed by washing.

To make the thermal liner dry faster, turn your Garments inside out. Moisture in your thermal liner reduces your insulation, comfort and overall protection during structural firefighting operations.

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. Garments should be stored at temperatures between 25° F and 180° F.



FIG. 16
Never store your Garments in direct sunlight, indirect sunlight, or in fluorescent light.

⚠ WARNING

Avoid storing your Garment in temperature extremes. Repeated cycles of heating and cooling can reduce the protective qualities and useful life of the Garment.

⚠ WARNING

NEVER STORE YOUR GARMENT, INCLUDING THE DRD, IN DIRECT SUNLIGHT, INDIRECT SUNLIGHT, OR IN FLUORESCENT LIGHT **(FIG. 16, FIG. 17)**. Exposure to light (particularly light in the sun's rays and fluorescent light) will severely weaken and damage the components in your Garment after only A FEW DAYS. Install UV filters on fluorescent lights. Damage caused by exposure to light cannot be repaired, nor will the manufacturer cover such damage in its warranty. See the Warranty Section of this Guide for more information.

⚠ CAUTION

Do not store your Garments in contact with contaminants such as oils, solvents, acids or alkalis as these can damage the garment.

⚠ CAUTION

Do not store Garments in air tight containers unless the Garments are new and have not been issued.

⚠ WARNING

Never store your Garments in living quarters with personal belongings, or within the passenger compartment of a vehicle. Prolonged exposure to contaminants remaining in the Garments may increase the risk of cancer or other diseases.



FIG. 17

The combination of exposure to direct sunlight and heat, and normal wear and tear most likely created the holes and worn-away areas of the aramid material in the thermal liner of the Garment shown in the photo. To maintain the useful life of your Garment, you must store it away from direct or indirect sunlight and fluorescent light. Always follow inspection and retirement requirements in this Guide.

15. RETIREMENT

15.1 USEFUL LIFE AND RETIREMENT

NFPA 1970 (1971) performance requirements are based on new, unworn Garments and composites. 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 of Garments can be as little as 3 to 5 years with heavy wear and tear or improper maintenance and/or storage. Useful life can be as long as 7 to 10 years if Garments have been subject to relatively lower levels of wear and tear and have been consistently maintained in a regular cleaning and maintenance program and stored properly. In compliance with NFPA 1850, Garments or Garment elements must be retired no more than 10 years from the date of manufacture.

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 chemicals
- 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 by trained professionals at each regular Advanced Inspection to determine whether they have exceeded their useful life and must be retired. Your Garments must be removed from service when they can no longer be safely used. Many departments replace garments when the cost of repair would exceed 50% of the cost of replacement.

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! Contact a trained expert within your department, LION, a LION TotalCare® Center, or a verified ISP.

15.2 FABRIC COLOR OR SHADE CHANGES

Garment textiles normally change color during their useful life as a result of soiling, washing, abrasion, or exposure to fireground conditions or U.V. light. Shade changes could sometimes indicate a compromise in the fabric's protective properties. Whenever you discover any change in color, inspect your Garment according to Section 6 of this Guide.

⚠ CAUTION

Most performance properties of the Garment and its components cannot be tested by the user in the field.

16. DISPOSAL

Retired uncontaminated Garments must be destroyed to prevent their unauthorized or mistaken use. Cut them into several pieces and dispose of properly. One suggested method of disposal is a landfill.

Retired Garments that are contaminated with blood or body fluids or hazardous chemicals should be placed in a plastic bag and properly disposed of. Follow federal, state, and local regulations governing disposal of hazardous materials.

⚠ WARNING

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

17. Turnout Gear Fabrics NFPA 1970 Additional Information

17.1 DETAILED DESCRIPTIONS OF MOISTURE BARRIERS, OUTER SHELLS AND THERMAL BARRIERS

MOISTURE BARRIERS			
LION Label	**Material**	**Weight/Description**	**Principal Materials of Construction**
GORE-TEX CROSSTECH BLACK MB	GORE-TEX CROSSTECH® BLACK Moisture Barrier	4.7 oz/yd² FR textile laminated to a proprietary Gore film	Aramid blend fibers in aramid blend face textile with DWR treatment, proprietary Gore film
GORE-TEX CROSSTECH PRIME MB	GORE-TEX CROSSTECH® PrimeMoisture Barrier	4.6 oz/yd² FR textile laminated to a proprietary Gore film	Aramid blend fibers in aramid blend face textile with DWR treatment, proprietary Gore film
GORE-TEX CROSSTECH INNOVATE MB	GORE-TEX CROSSTECH® Innovate Moisture Barrier	4.9 oz/yd² FR textiles laminated to a proprietary Gore film	Aramid blend fibers in aramid blend face textile, proprietary Gore film, aramid fibers in aramid backer
GORE-TEX CROSSTECH ENDURE MB	GORE-TEX CROSSTECH® Endure Moisture Barrier	6.3 oz/yd² FR textiles laminated to a proprietary Gore film	Aramid blend fibers in aramid blend face textile with DWR treatment, proprietary Gore film, aramid fibers in aramid backer
MILLIKEN ASSURE MB	MPG S000108100 Milliken Assure™	5.8 oz/yd² 93% Meta-Aramid, 5% Para-Aramid, 2% Antistat woven fabric laminated to a non-PFAS membrane	93% Meta-Aramid, 5% Para-Aramid, 2% Antistat
STEDAIR 3000 MB	Stedair 3000	4.5 oz/yd² Bi-component PTFE/PU film laminated to 85% Meta-Aramid, 15% Para-Aramid Spunlace with a non-Fluorinated DWR finish	Same as Description
STEDAIR 4000 MB	Stedair 4000	5.0 oz/yd² Bi-component PTFE/PU film laminated to 93% Meta-Aramid, 5% Para-Aramid, and 2% Antistat Woven with a non-Fluorinated DWR finish	Same as Description
STEDAIR GOLD MB	Stedair Gold	5.0 oz/yd² Bi-component PTFE/PU film laminated to 50% Meta-Aramid, 30% Para-Aramid 20% PBI Woven with a non-Fluorinated DWR finish	Same as Description
STRUCTURAL OUTER SHELLS			
LION Label	**Material**	**Weight Description**	**Principal Materials of Construction**
6.9 OZ FLEX 7	Flex7	6.9 oz/yd²	Para-Aramid/PBI Twill w/Non-PFAS Durable Water Repellent
6.6 OZ/SQ YD PIONEER	Pioneer™	6.6 oz/yd²	Para-Aramid/Meta-Aramid/Antistat
6.6 OZ/SQ YD AGILITY	Agility	6.6 oz/yd²	Para-Aramid/PBO/Meta-Aramid
7.5 OZ/SQ YD SNYERGY	MPG S000106175 Westex® Synergy	7.5 oz/yd²	93% Nomex, 5% Kevlar, 2% P-140
7.5 OZ/SQ YD GEMINI XT	Gemini XT/PBI XT	7.5 oz/yd²	Para-Aramid/PBI and a Filament Grid, Ristop with Non-PFAS Durable Water Repellent
7.2 OZ/SQ YD ADVANCE	Advance	7.2 oz/yd²	Para-Aramid/Meta-Aramid Blend
7.0 OZ/SQ YD PBI MAX	PBI MAX 7.0	7.0 oz/yd²	Proprietary PBI/Para-Aramid Blend
6.0 OZ/SQ YD PBI MAX	PBI MAX 6.0	6.0 oz/yd²	Proprietary PBI/Para-Aramid Blend
6.0 OZ/SQ YD PBI MAX LP	PBI MAX 6.0 LP	6.0 oz/yd²	Proprietary PBI/Para-Aramid Blend
6.5 OSY ARMOR AP	Armor AP	6.5 oz/yd²	65% Para-Aramid/35% Meta-Aramid
7.0 OSY HORIZON	MPG S000107505 Horizon or MPG S000107515 Horizon/7.0 oz/yd² ± 5%	7.0 oz/yd² ± 5%	50% Para-Aramid/48% Meta-Aramid/2% Antistat

LION PROPRIETARY THERMAL LINERS			
LION Label	**Material**	**Weight Description**	**Principal Materials of Construction**
GLIDE ICE CENTER CUT(C) THERMAL DWR	Aramid Rayon FR	8.2oz/yd² (Total System with Moisture Barrier layer included)	3.8 oz/yd² 100% Meta Aramid Twill Weave Face Cloth Quilted to 1 Layer of 1.5 oz/yd² Araflo Batting
GLIDE ICE 2L ARAFLO (K) THERMAL DWR	Aramid/Nylon FR	7.6 oz/yd²	3.8 oz/yd² 100% Meta Aramid Twill Weave Face Cloth Quilted to 1 Layer of 2.3 oz/yd² E-89 and 1 Layer of 1.5 oz/yd² Araflo Batting
GLIDE ICE 2L ARAFLO (B) THERMAL DWR	Aramid Rayon FR	7.6 oz/yd²	3.8 oz/yd² 100% Meta Aramid Twill Weave Face Cloth Quilted to 1 Layer of 2.3 oz/yd² E-89 and 1 Layer of 1.5 oz/yd² E89 Apertured Batting
TITANIUM 2L ARAFLO (H) THERMAL DWR	Aramid Rayon FR	7.6 oz/yd²	3.8 oz/yd² aramid/FR Rayon/Nylon quilted to 1 layer of 2.3 oz/yd² and 1 layer of 1.5 oz/yd² meta-aramid/ para-aramid non woven batt (67% Meta aramid/33% para-aramid) with a non-fluorinated durable water repellent (DWR)
LION PROPRIETARY THERMAL LINERS/MOISTURE BARRIER SYSTEM - CENTERCUT™ PLUS			
LION Label	**Material**	**Weight Description**	**Principal Materials of Construction**
GLIDE ICE W/GORETEX MB TECH (PTFE)			Glide Ice face cloth laminated to an enhanced bi-component ePTFE membrane. Meta-aramid/para-aramid three-dimensional non-woven batting laminated to an ePTFE film. 3 oz Meta-aramid Chambray Dri face cloth.
NONWOVEN/PTFE W/ CHAMBRAY DWR(G)TL	Aramid/Nylon FR	10.9oz/yd² (Total system)	

17.2 NFPA 1970 OUTER SHELL FUEL CONTAMINATION FLAME RESULTS

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Pioneer *Non-PFAS durable water repellant finish*	Fuel Contamination	Warp	34.3	0.1	64.9	27.5	15
		Fill	35.3	0.3	63.6	40.9	11
	Fuel Contamination followed by Cleaning	Warp	32.8	1.0	63.9	3.7	14
		Fill	31.1	1.7	62.1	1.3	12
	As Received	Warp	N/A	N/A	N/A	0.0	19
		Fill	N/A	N/A	N/A	0.0	19
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	16
		Fill	N/A	N/A	N/A	0.0	16

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Gemini XT / PBI XT *Non-PFAS durable water repellant finish*	Fuel Contamination	Warp	28.9	7.7	67.2	18.6	6
		Fill	32.3	0.4	67.5	25.4	6
	Fuel Contamination followed by Cleaning	Warp	26.4	1.6	69.8	2.0	10
		Fill	28.6	2.3	67.6	6.3	13
	As Received	Warp	N/A	N/A	N/A	0.0	14
		Fill	N/A	N/A	N/A	0.0	13
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	14
		Fill	N/A	N/A	N/A	0.0	12

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Flex7 *Non-PFAS durable water repellant finish*	Fuel Contamination	Warp	27.6	1.5	67.7	26.5	2
		Fill	31.2	0.5	65.2	25.3	2
	Fuel Contamination followed by Cleaning	Warp	32.4	0.5	65.7	0.0	0
		Fill	27.1	0.6	68.5	0.0	7
	As Received	Warp	N/A	N/A	N/A	0.0	13
		Fill	N/A	N/A	N/A	0.0	14
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	12
		Fill	N/A	N/A	N/A	0.0	12

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Brigade 750 *Non-PFAS durable water repellant finish*	Fuel Contamination	Warp	29.0	1.1	73.2	29.9	128
		Fill	28.6	0.2	81.9	21.7	67
	Fuel Contamination followed by Cleaning	Warp	28.6	-4.1	72.5	17.4	48
		Fill	29.6	-4.0	69.9	8.7	47
	As Received	Warp	N/A	N/A	N/A	0.0	68
		Fill	N/A	N/A	N/A	0.0	81
	After 5 Launderings	Warp	N/A	N/A	N/A	0.3	59
		Fill	N/A	N/A	N/A	0.6	60

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Agility *Non-PFAS durable water repellant finish*	Fuel Contamination	Warp	26.6	1.3	67.9	17.5	0
		Fill	19.4	0.1	65.7	27.8	0
	Fuel Contamination followed by Cleaning	Warp	35.0	0.5	68.2	0.2	0
		Fill	30.7	1.1	70.8	1.2	0
	As Received	Warp	N/A	N/A	N/A	0.0	5
		Fill	N/A	N/A	N/A	0.0	4
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	4
		Fill	N/A	N/A	N/A	0.0	4

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
Armor AP	Fuel Contamination	Warp	32.9	0	66.2	15.7	5.3
		Fill	34	0	66.6	16.4	4.7
	Fuel Contamination followed by Cleaning	Warp	28.1	1.3	68.5	1.1	12.7
		Fill	31	0	68.8	1.9	13.7
	As Received	Warp	N/A	N/A	N/A	0.0	14
		Fill	N/A	N/A	N/A	0.0	15
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	12
		Fill	N/A	N/A	N/A	0.0	14

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
PBI Max 6.0 or PBI Max 6.0 LP	Fuel Contamination	Warp	27.6	3.7	67.6	31.1	11
		Fill	30.5	1.7	64.6	24.9	11
	Fuel Contamination followed by Cleaning	Warp	26.2	4.8	65.2	0.5	17.3
		Fill	25.8	5.3	65	3.5	13.7
	As Received	Warp	N/A	N/A	N/A	0.0	18
		Fill	N/A	N/A	N/A	0.0	17
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	15
		Fill	N/A	N/A	N/A	0.0	17

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
PBI Max 7.0	Fuel Contamination	Warp	30.7	4.6	61.7	25.8	14
		Fill	30.7	6	62.3	20.1	12
	Fuel Contamination followed by Cleaning	Warp	23.9	10.3	63.5	0	12.7
		Fill	23.6	12.6	60.2	0	19
	As Received	Warp	N/A	N/A	N/A	0.0	18
		Fill	N/A	N/A	N/A	0.0	19
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	18
		Fill	N/A	N/A	N/A	0.0	18

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
PBI Max 7.0	Fuel Contamination	Warp	30.7	4.6	61.7	25.8	14
		Fill	30.7	6	62.3	20.1	12
	Fuel Contamination followed by Cleaning	Warp	23.9	10.3	63.5	0	12.7
		Fill	23.6	12.6	60.2	0	19
	As Received	Warp	N/A	N/A	N/A	0.0	18
		Fill	N/A	N/A	N/A	0.0	19
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	18
		Fill	N/A	N/A	N/A	0.0	18

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
MPG S000106175 Westex® Synergy - Hydropel Finish (non-PFAS water repel) - 7.5 osy	Fuel Contamination	Warp	31.2	13.7	100.0	41.5	85
		Fill	31.2	12.1	97.6	36.2	222
	Fuel Contamination followed by Cleaning	Warp	19.4	0.2	76.4	16.9	103
		Fill	20.0	0.3	82.5	12.0	104
	As Received	Warp	N/A	N/A	N/A	0.0	82
		Fill	N/A	N/A	N/A	0.0	82
	After 5 Launderings	Warp	N/A	N/A	N/A	0.0	70
		Fill	N/A	N/A	N/A	0.0	65

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
MPG S000107515 Horizon Black– Hydropel Finish (non-PFAS water repel)- 7.0 osy	Fuel Contamination	Warp	26.9	0.0	71.7	27.5	13
		Fill	28.2	0.0	69.4	29.0	19
	Fuel Contamination followed by Cleaning	Warp	24.4	0.8	74.2	2.6	29
		Fill	23.5	0.0	67.2	1.9	30
	As Received	Warp	N/A	N/A	N/A	0.0	37
		Fill	N/A	N/A	N/A	0.0	34
	After 5 Launderings	Warp	N/A	N/A	N/A	0.1	27
		Fill	N/A	N/A	N/A	0.1	24

Outer Shell Fabric and Finish	Condition	Direction	Indices of Penetration, Repellency, Absorption			Flame Resistance	
			I_P	I_R	I_A	Average Afterflame (s)	Average Char Length (mm)
MPG S000107505 Horizon Gold – Hydropel Finish (non-PFAS water repel)- 7.0 osy	Fuel Contamination	Warp	28.1	0.0	70.1	22.1	22
		Fill	28.0	0.0	71.2	32.3	19
	Fuel Contamination followed by Cleaning	Warp	24.7	0.0	68.8	3.8	32
		Fill	23.3	0.0	75.2	2.2	32
	As Received	Warp	N/A	N/A	N/A	0.0	82
		Fill	N/A	N/A	N/A	0.0	82
	After 5 Launderings	Warp	N/A	N/A	N/A	0.1	70
		Fill	N/A	N/A	N/A	0.0	65

18. LIMITED LIFETIME PRODUCT WARRANTY

Please use this QR code to access the limited warranty information for all LION products.

Contact LION Customer Support at 800-421-2926 or customersupport@lionprotects.com for questions.

19. INSPECTION, CLEANING, REPAIR, RETIREMENT AND DISPOSAL RECORD

Garment ID_____ **Model**_____ **Date of Garment Manufacture**_____

In the spaces below, note the activities performed on your Garment during its wear life.
Types of activities can include: Routine or Advanced Inspection; Routine or Advanced Cleaning; Decontamination; Repair; Alteration; Removal from Service; Retirement; Disposal, etc.

Date of Activity	Type of Activity	Reason for Activity	Description of Repair, Inspection Findings, etc.	Location on Garment	Inspection/ Cleaning/Repair Site	Activity Performed By	Date Returned to Service

Date of Retirement_____ Date and Method of Disposal_____

www.lionprotects.com

⚠ WARNING

It is your responsibility to use proper personal hygiene to reduce exposure to carcinogenic products of combustion.

PERSONAL RESPONSIBILITY 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

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www.femsa.org

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ready for action

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