



Flame Resistant Workwear

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| Document Number: RHS0001A | Standard – Administrative | Applies To: Regional |
| Revision Date: 2017/03/27 Revision: 1 Review Cycle: 3 Years | Document Owner (Title): Manager, H&S Operations | |

Summary of Changes

| Rev No. | Section Changed | Revision Made |
|---------|-----------------|---|
| 1 | | Regional document now includes other operating entities (formerly LMS0057A) Note title change from Fire Resistant Workwear to Flame Resistant Workwear. |
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Scope

This standard applies to all personnel who are required to wear flame resistant workwear (FRW) during normal work activities, outage or shutdown activities, and during non-routine or emergency operations in designated operating and support areas deemed as hazardous by Suncor Energy Inc.

Purpose

The purpose of this standard is to ensure flame resistant workwear (FRW) standards are established and required items are available and used by personnel, to minimize the severity of burn injuries from flash fires or electric arc flashes.

This standard outlines responsibilities and establishes selection criteria based on hazard assessments.

The goal of this standard is to provide appropriate protection to personnel in a manner consistent with regulatory requirements and accepted professional practice. At minimum, this standard shall be consistent with the current Alberta Occupational Health and Safety Code, Part 18 - Personal Protective Equipment unless otherwise noted.

Compliance

This document applies to work performed at Suncor Energy operating sites in the Wood Buffalo Region that includes Oil Sands, Fort Hills, Firebag, and DCL.

Any exceptions to this standard must follow the Management of Change process, approved through EHS, and must be accompanied by a formal hazard assessment.

Unless explicitly told that FRW is not required, FRW shall be worn during outages, shutdowns and turnarounds.

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Roles and Responsibilities

The following individuals and groups have the following roles and responsibilities:

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| Document Owner | <ul style="list-style-type: none">• Ensures this document is reviewed according to the required revision cycle.• Ensures the document is updated to accommodate changes to Suncor, provincial, and federal regulation.• Ensures the document is updated to mitigate risks found as the result of an incident. |
| Document Approver | <ul style="list-style-type: none">• Ensures this standard is necessary and that it aligns with management and company direction. |
| Line Management | <ul style="list-style-type: none">• Ensures implementation and adherence to this standard.• Ensures an area is established to contain contaminated FRW when necessary.• Ensures contaminated FRW is cleaned and/or disposed of in accordance to hazardous waste procedures and protocols. |
| Business Area Management | <ul style="list-style-type: none">• Provides workers with approved FRW as identified in this standard.• Conducts the hazard assessment to identify known and potential hazards as they relate to FRW. |
| Supply Chain Management | <ul style="list-style-type: none">• Ensures that only approved FRW garments are purchased and brought for use on site and that an adequate supply of flame resistant garments is maintained.• Ensures that flame resistant garments are manufactured, cleaned, and maintained in accordance with this standard and LMS0086A Specifications for Manufacturing Fire Resistant Garments. |
| Personnel | <ul style="list-style-type: none">• Performs their jobs in accordance with appropriate Operational Controls.• Notifies their supervisor or Suncor contact with any problems relating to those controls.• Must NOT wear flame resistant garments that are damaged or deteriorated beyond repair.• Ensures that clothing worn beneath flame resistant workwear and against the skin is made of flame resistant fabrics or natural fibres that will not melt when exposed to heat.• Identifies and returns their Suncor issued FRW in need of repair or beyond repair to the area Materials Management or tool crib attendant. |

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References

- [RGS0009A](#), Personal Protective Equipment
- [LMS0086A](#), Suncor Specifications for Manufacturing Fire Resistant Garments
- CAN/CGSB-155.20-2000 Workwear for Protection Against Hydrocarbon Flash Fire
- CAN/CGSB-155.1-2001 *Firefighters' Protective Clothing for Protection Against Heat and Flame*
- CAN/CGSB-155.21-2000 Recommended Practices for the Provision and Use of Workwear for Protection Against Hydrocarbon Flash Fire
- CAN/CSGB-155.22-2014 *Fireline Workwear for Wildland Firefighters*
- NFPA 2112 *Standard of Flame-Resistant Garments for Protection of Industrial Personnel against Flash Fire, 2012 edition*
- NFPA 2113 *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures*
- *NFPA 70E, Standard for Electrical Safety in the Workplace, 2015 edition*
- *CSA Z96-2014 High Visibility Safety Apparel*
- *ASTM F-1506- 10a, Standard Performance Specification for Flame Resistant and Arc Rated Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards*
- *OSHA 1910.269, APP E – Protection from Flames and Electric Arcs.*
- *CAPP Guide for the Selection and Use of Flame Resistant Workwear for Protection against Hydrocarbon Flash Fires (CAPP Publication # 2014-0005).*

Terms, Definitions and Acronyms

The following terms, definitions and acronyms are used in this standard:

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| Aramid Fabric | A manufactured fibre in which the fibres exhibit low flammability, high strength and high elasticity. These fibres maintain their integrity at high temperatures, but may shrink. |
| Cleaning | The removal of dirt and debris. |
| Chemically Treated Fabric | A chemical process or treatment is applied, where flame resistance is imparted to a material such as cotton or rayon. An untreated fabric would burn or melt when exposed to flame. Intense heat activates the flame-resistant chemicals which produce combustion inhibiting gases and char. |
| Component | Any material, part, or subassembly used in the construction of the garment necessary to meet the requirements of this standard. |

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Terms, Definitions and Acronyms (Continued)

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| Contamination / Contaminated | The process of transferring a hazardous material from its source to people, animals, the environment, or equipment, which may act as a carrier. |
| Cross-Contamination | The transfer of contamination from one item to another or to the environment. |
| Decontamination | The physical and/or chemical process of reducing and preventing the spread of contamination from persons and equipment used in a contaminated environment. |
| Emblem(s) | Shields, heraldry, or printing that designates a governmental entity or a specific organization; rank, title, position, or other professional status that is painted, screened, embroidered, sewn, glued, bonded, or otherwise attached in a permanent manner. |
| Fabric | The one or more layers of textile material(s) used in the primary construction of protective garment(s). |
| Fibre | A unit of matter, either natural or manufactured, that forms the basic element of fabrics and other textile structures. |
| Flame Resistance | The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source. |
| Flash Fire | A fire that spreads rapidly through a diffuse fuel, such as dust, gas, or the vapours of an ignitable liquid, without the production of damaging pressure. |
| FLHA | Field Level Hazard Assessment |
| FRW | Flame Resistant Workwear |
| Garments | Clothing including, but not limited to, coveralls, trousers, shirts, outerwear, and rainwear. |
| Heat Transfer | The thermal stability of the fibre components of a garment (weight and thickness) to provide a thermal barrier, with the requirements increasing with the intensity of the heat assault. |
| Hardware | Non-fabric components of the flame-resistant garment including, but not limited to, those made of metal or plastic. |
| Inherently Flame Resistant (IFR) fabric | Manufactured fabrics whose genetic material makes them naturally flame resistant without a chemical treatment. The molecular structure of the fibres does not support combustion. |

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Terms, Definitions and Acronyms (Continued)

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| Labelled | Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labelled equipment or materials, and by whose labelling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. |
| Lining | Any material that is attached and used to cover or partially cover the inside surface of a flame-resistant garment. |
| Melt | A response to heat by a material resulting in evidence of flowing or dripping. |
| PBI: Polybenzimidazole | A manufactured fibre with high chemical resistance that does not burn in air, has no melting point and does not drip when exposed to flame. |
| PPE | Personal Protective Equipment |
| Product Label | A label or marking affixed to a product by the manufacturer that provides general information, warnings, instructions for care and maintenance, and other information. |
| Reflective Striping | Material added to the exterior of the garment to enhance night time or daytime visibility. |
| Reinforcement | An additional layer of a textile material applied to a specific area of the protective garment to make that portion of the protective garment more resistant to wear. |
| Retirement | The process of removing protective clothing from service. |
| Seam | Any permanent attachment of two or more protective garment fabrics in a line formed by joining the separate material pieces. |
| Service Life | The period for which protective clothing is useful before retirement. |
| Static Electricity | The acquisition and retention of electrical charge through induction (by means of corona discharge) or by triboelectric means (rubbing with another material). |
| Trouser | A garment designed to provide minimum protection to the lower torso and legs, excluding the ankles and feet. |
| Wind/Moisture Barrier | A component of a protective garment designed to inhibit wind penetration and prevent the penetration of liquid water. |
| Wristlet | The circular, close-fitting extension of the coat sleeve, usually made of knitted material. |

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Standard**1. General****Item****Description**

- 1.1 Where the potential exists for a worker to be exposed to a flash fire or flashover of electrical equipment, flame resistant outerwear and associated personal protective equipment (PPE) must be used. See Appendix I for the list of applicable hazardous areas.
- 1.2 Workwear that is appropriate to wear as protection against flash fires or electric arc flashover should have the following characteristics:
- All flame resistant fabrics will comply with the requirements of the following standards:
 - **CAN/CGSB 155.20 – 2000**, Workwear for Protection against Hydrocarbon Flash Fire
 - **CAN/CGSB 155.21-2000**, Recommended Practices for the Provision and Use of Workwear for Protection against Hydrocarbon Flash Fire
 - **NFPA 2112 – 2012**, Standard of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire
 - **NFPA 70E –15**, NFPA 70E: Standard for Electrical Safety in the Workplace, 2015 Edition
 - **NFPA 2113**, Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel against Short Duration Thermal Exposures
 - **ASTM F1506-10a**- Standard Performance Specification for Flame Resistant and Arc Rated Textile Materials for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards
 - **PROBAN is not an acceptable fabric to be used in the Wood Buffalo region and is not permitted in any area requiring Flame Resistant Workwear.**
 - **Nomex is not to be worn for welding applications unless it is used in conjunction with standard welding outer material (e.g., leathers.)**

2. Hazard Assessment**Item****Description**

- 2.1 A specific hazard assessment of the work environment shall be conducted to determine the requirement for the wearing of flame resistant garments based on the known and potential flash fire or arc flash hazards present.

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Hazard Assessment (Continued)

| Item | Description |
|-------------|--|
| 2.2 | <p>Before selecting the type of flame resistant garment or protective equipment, the following factors shall be considered during the hazard assessment, but is not limited to:</p> <ul style="list-style-type: none">• Determination of the type of hazard or hazards present in the workplace and potential magnitude and duration of the hazard• Determination of adverse effects of unprotected exposure to the hazards identified• Determination of whether other control options (engineering, administrative, and so forth) can be used instead of flame-resistant garments• Determination of garment performance characteristics needed for protection• Determination of the need for garment decontamination where applicable• Determination of ergonomic constraints of work to be performed while wearing the garment• Comparison of risks and costs of all options• Implementation of selected option(s). |
| 2.3 | <p>Once in the field, flash fire and/or arc flash hazards should be identified and/or reassessed using the Field Level Hazard Assessment (FLHA) or equivalent before beginning work in the area to ensure the PPE selection is adequate for the workplace conditions.</p> |
| 2.4 | <p>Conductive articles (jewelry, watch bands, key chains, and baseball caps) shall not be worn where they present an electrical contact hazard with exposed live equipment.</p> |
| 2.5 | <p>In addition, the following factors shall be considered, but not be limited to, during the hazard assessment, before selecting the type of FRW:</p> <ul style="list-style-type: none">• Proximity of work to be performed to a hazard presenting a flash fire potential• Presence of flammable materials in the environment during process operations• Potential for the task being performed to increase the possibility of a flammable release; this could result from a mechanical failure such as a line breaking• Presence of engineering controls designed to reduce exposure to flammable materials present during normal operations• Incident history• Means and duration of egress within potential exposure zone (e.g., location and distance to exits, potential congestion, elevated or restricted areas, connections to lifelines / fall protection, capability of workers to escape, etc.). |

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3. Specifications for General Use

| Item | Description |
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| 3.1 | For maximum protection, flame resistant garments shall be worn as described in the manufacturer's instructions. |
| 3.2 | FRW is to be worn as the outermost layer of clothing. |
| 3.3 | Reflective striping is required on FRW worn as the outermost layer of clothing. |
| 3.4 | FRW collars shall be worn closed. |
| 3.5 | FRW sleeves and cuffs shall be worn down and secured. |
| 3.6 | Protective neck, head, hand, and foot coverings shall be worn if the occupational hazard warrants their use and must be constructed of flame resistant fabric or contained by a flame resistant hood. |
| 3.7 | Other personal protective equipment (PPE) shall be worn as determined by the review of hazards to which workers are or may be exposed. |
| 3.8 | Workers shall not be permitted to wear non-flame resistant clothing over flame resistant garments. |
| 3.9 | Flame resistant or non-melting undergarments (the layer closest to the skin) shall be used. An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted. |
| 3.10 | Only natural fibres should be worn under flame resistant garments. Synthetic fabrics such as nylon, polyester and acrylic can melt if exposed to excessive heat from a flash fire or electric arc flashover. |
| 3.11 | FRW should be properly fitted. |
| 3.12 | FRW must be free of excessive oils and greases and should have no tears, rips, holes, or gaps that would expose the clothing or the skin underneath to direct heat and flame. Metal snaps and zippers should be covered or enclosed with the FRW fabric. |
| 3.13 | FRW, once exposed to a flash fire, electric arc flashover or excessive heat, must be returned to the Supply Chain warehouse or Area tool crib attendants for proper inspection/disposal. |
| 3.14 | Rain gear and slickers used for chemical resistance and weather, are available in flame resistant fabrics but are not flame resistant by themselves. These garments can be used safely if a layer of FRW is worn underneath under the rain gear and slickers. |

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4. Selection

| Item | Description |
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| 4.1 | The selection of FRW will comply with NFPA 2113, <i>Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures</i> . |
| 4.2 | When selecting FRW, the following factors will be considered, but are not limited to: <ul style="list-style-type: none">• Thermal protective characteristics of the fabric• Physical characteristics of the fabric• Garment construction and components (for example, pockets, types of closures and fasteners, etc.)• Avoidance of static charge buildup• Design type of the garment• Type of conditions under which garments will be worn• Comfort properties of the fabric and garment• Cleaning and maintenance considerations. |
| 4.3 | Garments shall be selected so that they cover both the upper and lower body and non-flame resistant under layers as completely as possible. |
| 4.4 | Garments shall be selected that: <ul style="list-style-type: none">• Contain primary closure systems that function after exposure to a flash fire hazard and that avoid meltable closure systems (e.g., non-flame resistant hook-and-loop).• Offer minimal interference and minimal hindrance to perform the work task required in the flash fire or electrical flashover hazard zone.• Provide optimum protection so as not be tight fitting.• Non-flame resistant emblems attached to the exterior of the garment (e.g., logos, name tags, non-flame-resistant silk-screened artwork, etc.) shall be kept to a minimum, both in surface area and number and must be attached over a minimum of two layers of fire resistant fabric (e.g., sewn over a pocket). |

5. Purchase

| Item | Description |
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| 5.1 | Flame resistant garments to be purchased shall comply with this standard and where necessary, must comply with LMS0086A , Suncor Specifications for Manufacturing Flame Resistant Garments. |

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6. Pre-Use Inspection

| Item | Description |
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| 6.1 | All flame resistant garments must be used as per manufacturer's instructions and are not to be modified in any way. |
| 6.2 | All components of FRW will be inspected before each use for damage, soiling or contamination. |
| 6.3 | All personnel are expected not to use FRW that is worn, damaged, or modified beyond its manufacturers specified utilization limits. No FRW will be used that is not able to perform the function for which it was designed. |

7. Cleaning, Inspection, Maintenance, and Storage

| Item | Description |
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| 7.1 | Inspection, cleaning and servicing of all types of flame resistant garments will be conducted according to manufacturer's instructions. |
| 7.2 | All FRW should be stored in a clean, dry location free from contamination and in a functionally effective condition. |
| 7.3 | Certain cleaning agents and procedures can affect the flame resistance of some types of flame resistant garments. Flame resistant garments/ fabrics must not be exposed to bleaching agents. Patching and repairs shall only be done with similar flame resistant patches and thread. |
| 7.4 | It is crucial to clean FRW or remove the garment from service and replace with a clean garment if the FRW is contaminated with hydrocarbons and used in a high risk area as soiling will reduce the protective qualities of the garment and increase the risk of second and third degree burns. |
| 7.5 | Contaminated FRW and other PPE should be removed before entering an uncontaminated or clean area. Contaminated FRW must be segregated and disposed of according to hazardous waste procedures and protocols. |

End of Standard

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Appendix 1 – Areas / Tasks Requiring Use of Flame Resistant Workwear

| BUSINESS AREA | | AREA | TASKS |
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| Extraction | Operations | Plant 4 (including IPS #1/2) Plant 16 Plant 87 And all tasks identified | <ul style="list-style-type: none"> All hot work All work around electrical equipment where a potential for electrical arcing exists. |
| | Maintenance | | <ul style="list-style-type: none"> All hot work All Maintenance Work Nomex is not to be worn for welding applications unless used in conjunction with standard welding outer material (e.g. leathers.) All work around electrical equipment where a potential for electrical arcing exists. |
| Upgrading | Operations | ALL Plants and Offplot areas | <ul style="list-style-type: none"> All work unless noted specifically on a Safe Work Permit. |
| | Maintenance | | <ul style="list-style-type: none"> All work unless noted specifically on a Safe Work Permit All work around electrical equipment where a potential for electrical arcing exists |
| Mine | Welders Electricians | | <ul style="list-style-type: none"> All welding Nomex is not to be worn for welding applications unless it is used in conjunction with standard welding outer material (e.g. leathers.) All work around electrical equipment where a potential for electrical arcing exists |
| Fort Hills Operations (excluding Mine and Mine Maintenance) | Operations and Maintenance | All areas | <ul style="list-style-type: none"> All hands-on tasks outside of an office setting. |
| Emergency Services | Emergency Response | ALL Plants and Offplot areas | <ul style="list-style-type: none"> Emergency Response |
| Firebag – In Situ Operations | Operations and Maintenance Drilling and well service operations | All designated areas | <ul style="list-style-type: none"> All hands on tasks outside of an office setting. Does not include seismic, corehole construction or gravel operations |

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The following individuals have approved and signed this document.

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