

ARC FLASH PROTECTIVE CLOTHING



Introduction to Arc Flash Protection

Arc Flash

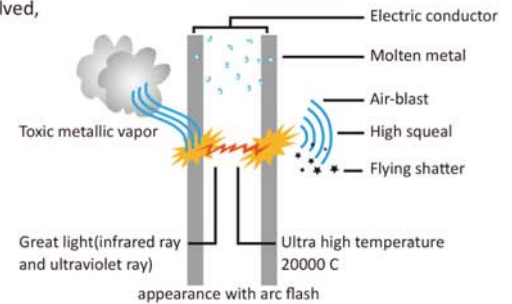
- An arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury.

Arc Flash Hazard

- Arc flash temperatures can reach or exceed 35,000 °F (19,400 °C) at the arc terminals. The massive energy released in the fault rapidly vaporizes the metal conductors involved, blasting molten metal and expanding plasma outward with extraordinary force.
- A typical arc flash incident can be inconsequential but could conceivably easily produce a more severe explosion. The result of the violent event can cause destruction of equipment involved, fire, and injury not only to an electrical worker but also to bystanders.

Arc Flash Accident

- According to NFPA report, 5-10 accidents happen in United States every day, and more than 2000 deaths in Arc Flash accident every year.
- Average annual electrical accidents in France are more than 125 cases. Arc flash accident accounted for 77%, permanent disability accounted for 21%, and deaths from 30 cases.



Important Safety Recommendations: NFPA70E

Hazard Level 1



Garment description:
FR Shirt and FR
pants or FR
Coverall.

ATPV: 4-8 cal/cm²

Hazard Level 2



Garment description:
Cotton underwear,
FR Shirt and FR
pants.

ATPV: 8-25 cal/cm²

Hazard Level 3



Garment description:
Cotton underwear,
FR shirt, pants or
cotton underwear
plus two FR
coveralls.

ATPV: 25-40 cal/cm²

Hazard Level 4



Garment description:
Cotton
underwear, FR
shirt, FR pants,
Multilayer arc
flash suit.

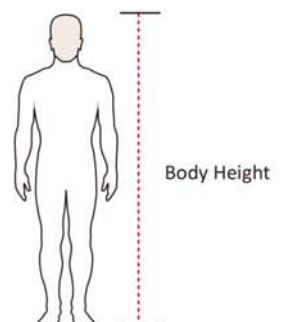
ATPV: >40 cal/cm²

cal/cm² ----- Thermal Units
1 cal ----- 1 gram of water temperature rises to 1 °C .
1cal/cm² -----Equivalent to put a finger on the energy released by
burning a cigarette for 1 second.
1~2cal/cm² energy can cause second degree burns.

ATPV (Arc Thermal Performance Value)
-----used to characterize arc flash protection capability
of fabrics. If the energy produced from electric arc in
accident is less than ATPV of the fabric, the garment
can protect workers from second and above burns.

Size: (cm)

| | XS | S | M | L | XL | 2XL | 3XL |
|------------------|---------|---------|---------|---------|---------|---------|---------|
| Body Height | 153-158 | 158-163 | 163-168 | 168-173 | 173-178 | 178-183 | 183-188 |
| Sleeve Length | 56 | 57 | 58 | 59 | 60 | 61 | 62 |
| Chest Girth | 112 | 116 | 120 | 124 | 128 | 132 | 136 |
| Shoulder Breadth | 44 | 46 | 48 | 50 | 52 | 54 | 56 |
| Outseam | 98 | 100 | 102 | 104 | 106 | 108 | 110 |
| Waistline | 78 | 82 | 86 | 90 | 94 | 98 | 102 |






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Selection Guide for Arc Flash Protective Garment

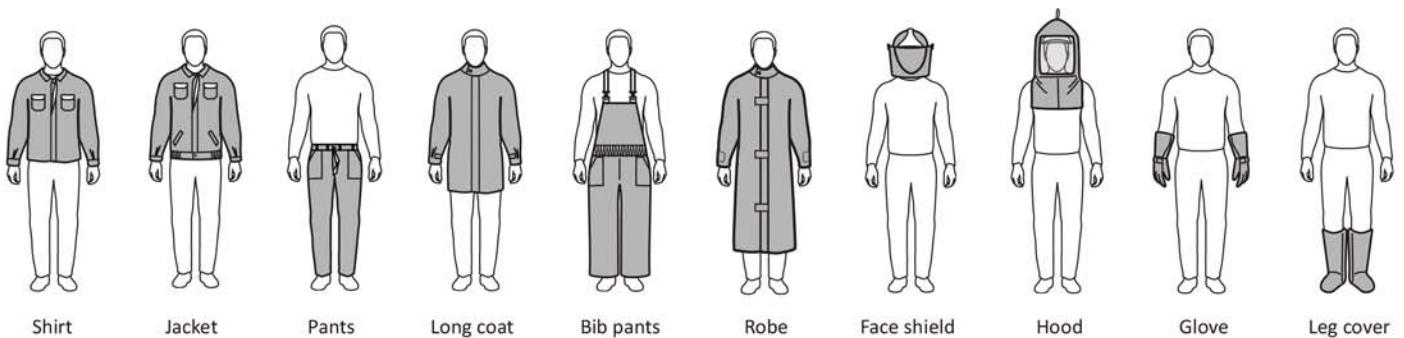
Lakeland Arc Flash Protective Garment is made of high standard of arc flash resistant fabric.

- **Lenzing Arc Stopper (LAS)** ---- LAS fabric is made of Lenzing FR fiber and aramid fiber. Lenzing FR fiber is produced from nature raw material, which offers protection against heat and flame in a variety of different applications with the features of comfort, soft, breathability and skin-friendliness. It meets the requirements of USDA and Oeko-Tex Standard 100.
- **Tecasafe Plus (TSP)**---- TSP fabric is made of 48% FR-modacrylic, 37% Lyocell and 15% aramid, which offers inherent protection with the features of comfort, softness and breathability. It's tested according to ASTM F 1959 and meets the requirements of NFPA 70E.
- **Indura Ultra Soft (IUS)** ---- IUS fabric is made of 88% FR cotton and 12% which has high arc protective performance with the features of softness and durability. It's tested according to ASTM F 1959 and meets the requirements of NFPA 70E.
- **DH**----- DH fabric is made of 48% Tencel, 40% modacrylic and 12% aramid. It's a dual-hazard fabric that protects against both flash fire and electric arc, which meets the requirements of NFPA 2112.

Hazard Level and Fabric Introduction

| | CAT Level | Fabric Introduction | Fabric Description(OZ) | ATPV(cal/cm ²) |
|------|-----------|---|----------------------------------|----------------------------|
| AR8 | CAT2 |  | 7.7 oz LAS | 8 |
| AR8 | CAT2 |  | 6.5 oz DH | 8.9 |
| AR8 | CAT2 |  | 7.0 oz TSP | 9 |
| AR12 | CAT2 |  | 9.0 oz IUS | 12.4 |
| AR16 | CAT2 |  | 8.3 oz LAS | 16 |
| AR26 | CAT3 |  | 6.5 oz DH+6.5 oz DH | 26 |
| AR33 | CAT3 |  | 7.0 oz TSP+7.0 oz TSP | 33.2 |
| AR43 | CAT4 |  | 7.0 oz TSP+7.0 oz TSP+7.0 oz TSP | 43 |
| AR48 | CAT4 |  | 6.5 oz DH+6.5 oz DH+6.5 oz DH | 48 |

Style:



Color: Navy Royal Orange Khaki

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Lakeland can supply different grades of arc flash protective suits made of different fabric, which can meet the requirements of arc flash protection in different workplaces.

Fabric Recommendation

- DH: inherently FR fabric. Soft and comfortable. Excellent protection against arc flash. Low cost.
- Tecasafe Plus(TSP): inherently FR fabric. Excellent protection against arc flash.

CAT and ATPV

CAT3: 26cal/cm² (2 layers 6.5oz DH fabric) 33cal/cm² (2 layers 7.0oz TSP)

CAT4: 48cal/cm² (3 layers 6.5oz DH fabric) 43cal/cm² (3 layers 7.0oz TSP)

Arc Flash Protective Hood

- Arc shield and fabric are connected by flame retardant buckle.
- Easy to clean. With hanging ring on the top for easy storage.
- With helmet bracket and buckle, helmet can be assembled inside the hood.
- Anti-fog coating.
- Adequate space for head movement.
- Hood overlapped the coat for safety.
- ATPV values on the lower left corner of front side.



Long Coat

- 32" length for full coverage. Stand up collar for better protection.
- FR Velcro front closure.
- Raglan sleeve design offers superior freedom of movement.
- No metal accessories which may induct arc flash accident.



Bib Pants

- Bib style for comfort wearing.
- Adjustable loop and buckles on bib strap.
- Tear drop style swing pockets hold plenty items.
- Velcro leg openings with gussets make for easy on and off.
- No metal accessories which may induct arc flash accident.



Arc Flash Protective Gloves

- 40cm length gloves for full coverage with sleeves.
- Can be used with coat.



Arc Flash Protective Leg covers

- Leg covers can be used with boots or insulated shoes.
- Can be used with pants.



Carry Bag

Arc flash protective suit can be put into the carry bag.





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Arc Flash Protective Face Shield

- Made from high polymer and manufactured by injection molding. • With helmet bracket and buckle. • ARC-SK2-8 without mandibular protection, ARC-S2K2-10 and ARC-FS-12 with mandibular protection. • Designed to meet ANSI 187.1 and EN 170. • Ultra-wide field of view (shield size: 7.25" x 10" x 20" x 0.06). • Light green, up to 70% Visible Light Transmittance. • More than 99.9% harmful ultraviolet radiation can be absorbed. • With anti-fog coating.
- Adequate facial space for head movement and neck protection.

| Product Code | ATPV | Description |
|--------------|-----------------------|--|
| ARC-SK2-8 | 8cal/cm ² | Polycarbonate, light green, anti-fog coating, with visor bracket and elastic belt. |
| ARC-FB-12 | 12cal/cm ² | Polycarbonate, light green, anti-fog coating, with mandibular protection, with visor bracket and elastic belt. |
| ARC-FS-12 | 12cal/cm ² | Polycarbonate, light green, anti-fog coating, with mandibular protection, with slot adaptor and visor bracket. |



Arc Flash Protective Hood

- Above HRC3. • Arc shield and fabric are connected by flame retardant buckle. Easy to clean. • With hanging ring on the top for easy storage. • With helmet bracket and buckle, helmet can be assembled inside the hood. • Anti-fog coating. • Adequate space for head movement. • Hood overlapped the coat for safety. • ATPV value is on the lower left corner of front side.

| Product Code | ATPV | Description |
|--------------|-------------------------|---|
| AR26HD | 25cal/cm ² | Arc shield 25cal/cm ² , fabric 26cal/cm ² |
| AR33HD | 33.2cal/cm ² | Arc shield 40cal/cm ² , fabric 33.2cal/cm ² |
| AR43HD | 40cal/cm ² | Arc shield 40cal/cm ² , fabric 43cal/cm ² |
| AR48HD | 48cal/cm ² | Arc shield 75cal/cm ² , fabric 48cal/cm ² |



Arc Flash Protective Shirt

- Three protective levels: 8cal/cm², 8.9cal/cm², 9cal/cm². • Soft, breathable and very comfortable. • Two chest pockets, ATPV value above the left chest pocket. • Resin buttons, curved hem. • Suitable for spring and summer.

| Product Code | ATPV | Description |
|--------------|------------------------|----------------------------|
| AR8-S-LAS | 8cal/cm ² | 7.7 oz Lenzing Arc Stopper |
| AR8-S-DH | 8.9cal/cm ² | 6.5 oz DH |
| AR8-S-TSP | 9cal/cm ² | 7.0 oz Tecasafe plus |



Arc Flash Protective Jacket

- Different protective levels:
- 8cal/cm², 8.9cal/cm², 9cal/cm², 12.4cal/cm², 16cal/cm², 26cal/cm², 33.2 cal/cm². • Sewed with Nomex. • Double closure, covered button under outer closure. • Hard resin zipper. • Sandwich design on the front side. • Two chest pockets. • ATPV value above the left chest pocket. • Two side pockets. • Hem elastic design.
- Without arc induced metal accessories.

| Product Code | ATPV | Description |
|--------------|-------------------------|-------------------------------|
| AR8-J-LAS | 8cal/cm ² | 7.7 oz Lenzing Arc Stopper |
| AR8-J-DH | 8.9cal/cm ² | 6.5 oz DH |
| AR8-J-TSP | 9cal/cm ² | 7.0 oz Tecasafe plus |
| AR12-J-IUS | 12.4cal/cm ² | 9.0 oz Indura Ultra Soft |
| AR16-J-LAS | 16cal/cm ² | 8.3 oz Lenzing Arc Stopper |
| AR26-J-DH | 26cal/cm ² | 2 layers 6.5 oz DH |
| AR33-J-TSP | 33.2cal/cm ² | 2 layers 7.0 oz Tecasafe plus |



Arc Flash Protective Pants

- Different protective levels:
- 8cal/cm², 8.9cal/cm², 9cal/cm², 12.4cal/cm², 16cal/cm², 26cal/cm², 33.2 cal/cm². • Sewed with Nomex. • Two side pockets, two back pockets, ATPV value on the right back pocket. • Used in conjunction with Arc Flash Protective Jacket. • Without arc induced metal accessories.

| Product Code | ATPV | Description |
|--------------|-------------------------|-------------------------------|
| AR8-P-LAS | 8cal/cm ² | 7.7 oz Lenzing Arc Stopper |
| AR8-P-DH | 8.9cal/cm ² | 6.5 oz DH |
| AR8-P-TSP | 9cal/cm ² | 7.0 oz Tecasafe plus |
| AR12-P-IUS | 12.4cal/cm ² | 9.0 oz Indura Ultra Soft |
| AR16-P-LAS | 16cal/cm ² | 8.3 oz Lenzing Arc Stopper |
| AR26-P-DH | 26cal/cm ² | 2 layers 6.5 oz DH |
| AR33-P-TSP | 33.2cal/cm ² | 2 layers 7.0 oz Tecasafe plus |

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Arc Flash Protective Robe



Different protective levels:

- 12.4cal/cm², 16cal/cm², 26cal/cm², 33.2cal/cm², 43cal/cm², 48cal/cm². • 5cm wide FR velcro front closure with 3 cross Velcro for reinforcement. • Stand-up collar for better protection. • Velcro closure cuff of sleeves. • Can be used with our arc protective hood, gloves and boot covers. • No metal accessories which may induce arc flash accident.

| Product Code | ATPV | Description |
|--------------|-------------------------|-------------------------------|
| AR12-R-IUS | 12.4cal/cm ² | 9.0 oz Indura Ultra Soft |
| AR16-R-LAS | 16cal/cm ² | 8.3 oz Lenzing Arc Stopper |
| AR26-R-DH | 26cal/cm ² | 2 layers 6.5 oz DH |
| AR33-R-TSP | 33.2cal/cm ² | 2 layers 7.0 oz Tecasafe plus |
| AR43-R-TSP | 43cal/cm ² | 3 layers 7.0 oz Tecasafe plus |
| AR48-R-DH | 48cal/cm ² | 3 layers 6.5 oz DH |

Arc Flash Protective Long Coat and Bib Pants Long Coat

Different protective levels:

- 26cal/cm², 33.2cal/cm², 43cal/cm², 48cal/cm². • 32" length for full coverage. • Stand-up collar for better protection. • FR velcro front closure. • Raglan sleeves design offers superior freedom of movement. • No metal accessories which may induce arc flash accident.

Bib Pants

Different protective levels:

- 26cal/cm², 33.2cal/cm², 43cal/cm², 48cal/cm². • Bib style for comfort wearing. • Adjustable loop and buckles on bib strap. • Tear drop style swing pockets hold plenty items. • Velcro leg openings with gussets make for easy on and off. • No metal accessories which may induce arc flash accident.

| Product Code | | ATPV | Description |
|--------------|-----------|-------------------------|-------------------------------|
| Long Coat | Bib Pants | | |
| AR26SC | AR26BO | 26cal/cm ² | 2 layers 6.5 oz DH |
| AR33SC | AR33BO | 33.2cal/cm ² | 2 layers 7.0 oz Tecasafe plus |
| AR43SC | AR43BO | 43cal/cm ² | 3 layers 7.0 oz Tecasafe plus |
| AR48SC | AR48BO | 48cal/cm ² | 3 layers 6.5 oz DH |

Arc Flash Protective Gloves and Leg covers

- 40cm length gloves for full coverage with sleeves. • Leg covers can be used with boots or insulated shoes. • Gloves and Leg covers can be used with coat and pants.

| Product Code | | ATPV | Description |
|--------------|------------|-------------------------|-------------------------------|
| Gloves | Leg covers | | |
| AR8-G-LAS | AR8-C-LAS | 8cal/cm ² | 7.7 oz Lenzing Arc Stopper |
| AR8-G-DH | AR8-C-DH | 8.9cal/cm ² | 6.5 oz DH |
| AR8-G-TSP | AR8-C-TSP | 9cal/cm ² | 7.0 oz Tecasafe plus |
| AR12-G-IUS | AR12-C-IUS | 12.4cal/cm ² | 9.0 oz Indura Ultra Soft |
| AR16-G-LAS | AR16-C-LAS | 16cal/cm ² | 8.3 oz Lenzing Arc Stopper |
| AR26-G-DH | AR26-C-DH | 26cal/cm ² | 2 layers 6.5 oz DH |
| AR33-G-TSP | AR33-C-TSP | 33.2cal/cm ² | 2 layers 7.0 oz Tecasafe plus |
| AR43-G-TSP | AR43-C-TSP | 43cal/cm ² | 3 layers 7.0 oz Tecasafe plus |
| AR48-G-DH | AR48-C-DH | 48cal/cm ² | 3 layers 6.5 oz DH |



Gloves

Leg covers