

# Understanding Arc Flash Protection



What is Arc Flash?

What are hazards of Arc Flash?

How do you select an Arc Flash protective garment?

<b>1.</b>	<b>What is Arc Flash?</b> Arc Flash occurs when an electrical charge jumps between two terminals or from a terminal to earth	Arc Flash incidents can occur in any industrial situation where a fault in a circuit occurs	<b>2.</b>	<b>What are the hazards of Arc Flash?</b> Arc Flash incidents present 3 hazard types
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Arc Flash protective garments are primarily designed to protect against the heat hazard of electric arc and not the electrical shock or concussive force.

In an instant an arc flash incident can generate enormous amounts of heat energy and temperatures of up to 35,000°C... that's roughly the temperature of the surface of the sun!

Why?

Studies suggest that 80% of Arc Flash incident fatalities occur as a result of burns from the intense heat generated.

<b>3.</b>	<b>How do you select the correct Arc Flash garment?</b>	There are three stages to selecting an arc flash garments		
		<b>A. ASSESS</b>	<b>B. IDENTIFY</b>	<b>C. SELECT</b>
Assess incident heat energy level		Identify appropriate Hazard Risk Category (HRC) or Arc Thermal Protective Value (ATPV) requirement	Select garment or garment combination with the correct minimum HRC or ATPV	

## A. ASSESS the incident heat energy level

The energy level released in an arc flash incident can be calculated according to the voltage in the circuit, the working distance from the terminal, the distance between the terminals and the related equipment class.

This should only be done by a qualified electrical engineer!



- Heat energy calculators are available on the internet
- US standard NFPA 70E identifies a method of calculating heat energy levels
- NFPA 70E also provides a list of standard tasks with associated heat energy levels and HRC

Heat energy levels are measured in Calories / cm<sup>2</sup>

A 'Calorie' is a measurement of energy:  
 - raise the temperature of 1 gram of water  
 - through 1°C (defined as 4.1868 joules)

## B. IDENTIFY the required ATPV or HRC

**ATPV = Arc Thermal Protective Value**

**ATPV is the 'arc rating'** - the identified heat energy level protection value of clothing designed for arc flash protection. Measured according to European test **EN 61482-1-1** OR **ASTM F1959**.

These tests measure the level of protection in cal/cm<sup>2</sup> based on 'the heat energy required to pass through the fabric resulting in 50% probability of a 2nd degree burn'

**HRC = Hazard Risk Category**

HRC is the identified classification of garments according to the ATPV measurement and defines four classes of garment:-

HRC 1	HRC 2	HRC 3	HRC 4
4	8	24	40

Hazard Risk Category (up to cal/cm<sup>2</sup>)

EN 61482-1-2 measures arc protection for low energy levels according to the 'arc-in-a-box' method. It identifies two classes of protection. This certification does NOT identify an ATPV and certified garments are suitable only for protection in low voltage situations.

EN 61482-1-2: Class 1 - Up to 4Ka  
 EN 61482-1-2: Class 2 - Up to 7Ka

## C. SELECT Arc clothing with the minimum required HRC or ATPV rating

Arc clothing should be labelled EITHER with an HRC classification or an ATPV rating.

*EXAMPLE:* If assessed Heat Energy Level in the incident is 23 cal/cm<sup>2</sup>, the garments selected should be either:

HRC Class 3 (up to 24 cal/cm<sup>2</sup>) OR An ATPV rating of AT LEAST 23 cal/cm<sup>2</sup>

**Layering of garments** Combinations of garments can be used to increase protection to the required level. Thus wearing 2 layers of clothing with an ATPV of 8 cal/cm<sup>2</sup> can be reasonably assumed to achieve an ATPV of at least 16 cal/cm<sup>2</sup>.