



# **Armour Hazard Protection Garment Safety Standards Explained**

**Hi Vis Arc Flash coveralls**

**AHP001-101**

**AHP001-102**

**AHP002-101**

**AHP002-102**

**EN 1149-5  
2018**



**Pt.3 :2004  
Charge Decay**

**EN 1149-5:2018, Pt. 3:2004 Charge Decay** - standard specifies material and design requirements for electrostatic dissipative protective clothing, used as part of a total earthed system, to avoid incendiary discharges. This may not be sufficient in oxygen enriched flammable atmospheres and is not applicable for protection against mains voltage. Part 5 stipulated the material performance and design requirements of the garment which have been covered and met for this Coverall.

The person wearing the electrostatic dissipative protective clothing shall be properly earthed. The resistance between the person's skin and earth shall be less than 108 Ω, e.g. by wearing adequate footwear on dissipative or conductive floors.

Electrostatic dissipative protective clothing shall not be open or removed whilst in presence of flammable or explosive atmospheres or while handling flammable or explosive substances

Electrostatic dissipative protective clothing is intended to be worn in Zones 1, 2, 20, 21 and 22 (see EN 60079-10-1 [7] and EN 60079-10-2 [8]) in which the minimum ignition energy of any explosive atmosphere is not less than 0,016 mJ

Electrostatic dissipative protective clothing shall not be used in oxygen enriched atmospheres, or in Zone 0 (see EN 60079-10-1 [7]) without prior approval of the responsible safety engineer

The electrostatic dissipative performance of the electrostatic dissipative protective clothing can be affected by wear and tear, laundering and possible contamination

Electrostatic dissipative protective clothing shall be worn in such a way that it permanently covers all non-complying materials during normal use (including bending movements).

It is important that the Coverall is fully fastened when worn, covering all non electrostatic dissipative clothing. It should be worn in conjunction with protective footwear. If the garment rips, tears or reveals any non outer material or components, it should not be worn.

Electrostatic protection – dissipative clothing to avoid incendiary charges in the form of charge decay (EN 1149-3) - Touch and close fastenings present on the garment shall not be opened when operating in hazard zones.

**EN ISO 20471  
2013 + A1:2016**

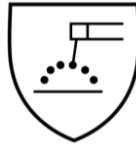


**Class 3**

**EN 20471:2013+A1:2016 Class 3** – Hi Visibility Clothing Standard is an international standard for the safety requirements and test methods of hi-vis workwear, and is applicable to high-risk situations. It specifies requirements for “high visibility clothing which is capable of visually signaling the user's presence” and assesses the suitability and durability of retro-reflective materials. Class 3 is the highest level of visibility.

Clothing is designed to provide protection in areas of low conspicuity, class 3 is the highest level and class 1 is the lowest level. High visibility protection for use in areas of low conspicuity for passive road users (EN ISO 20471 Class 1) where vehicle speed ≤ 30 km/h. High visibility protection for use in areas of low conspicuity for passive road users (EN ISO 20471 Class 2) where vehicle speed ≤ 60 km/h. High visibility protection for use in areas of low conspicuity for passive road users (EN ISO 20471 Class 3) where vehicle speed > 60 km/h

EN ISO 11611  
2015



Class 1, A1

**EN ISO 11611:2015** - Protective clothing for use in welding and allied processes. This type of protective clothing is intended to protect the wearer against spatter (small splashes of molten metal), short contact time with flame, radiant heat from an electric arc used for welding and allied processes, and minimizes the possibility of electrical shock by short-term, accidental contact with live electrical conductors at voltages up to approximately 100 V d. c. in normal conditions of welding. Sweat, soiling, or other contaminants can affect the level of protection provided against short-term accidental contact with live electric conductors at these voltages.

**Class 1**  
Provides protection for less hazardous welding methods and situations, with lower levels of spatter and radiant heat. The material must withstand at least 15 drops of molten metal.

**Class 2**  
Provides protection for riskier welding methods and situations, with higher levels of spatter and radiant heat. The material must withstand at least 25 drops of molten metal.

A1: Limited flame spread, surface ignition  
A2: Limited flame spread, edge ignition.

<b>GUIDANCE FOR THE SELECTION OF THE CLASS OF WELDERS' CLOTHING</b>	
<b>SELECTION CRITERIA RELATING TO THE PROCESS:</b>	<b>SELECTION CRITERIA RELATING TO THE ENVIRONMENTAL CONDITIONS:</b>
<p>Manual welding techniques, light formation of spatters and drops, e.g.:</p> <ul style="list-style-type: none"> <li>• Gas welding</li> <li>• Tig welding</li> <li>• Mig welding</li> <li>• Micro plasma welding</li> <li>• Brazing</li> <li>• Spot welding</li> <li>• MMA welding (with rutile-covered electrode)</li> </ul>	<p>Operation of machines, e.g. of:</p> <ul style="list-style-type: none"> <li>• Oxygen cutting machines</li> <li>• Plasma cutting machines</li> <li>• Resistance welding machines</li> <li>• Machines for thermal spraying</li> <li>• Bench welding</li> </ul>
<p>Manual welding techniques, heavy formation of spatters and drops, e.g.:</p> <ul style="list-style-type: none"> <li>• MMA welding (with basic or cellulosecovered electrode)</li> <li>• Mag welding (with CO<sup>2</sup> or mixed gases)</li> <li>• MIG welding (with high current)</li> <li>• Self-shielded flux cored arc welding (FCAW)</li> <li>• Plasma cutting</li> <li>• Gouging</li> <li>• Oxygen cutting</li> <li>• Thermal spraying</li> </ul>	<p>Operation of machines, e.g. of:</p> <ul style="list-style-type: none"> <li>• In confined spaces</li> <li>• At overhead welding/cutting or in comparable constrained positions</li> </ul>

A additional partial body protection may be required e.g. for welding overhead protection. The garment is only intended to protect against brief, inadvertent contact with live parts of an arc welding circuit, and that additional electrical insulation layers will be required where there is an increased risk of electric shock; garments are designed to provide protection against short term, accidental contact with live electric conductors at voltages up to approximately 100 V d.c.

The level of protection against flame will be reduced if the welders' protective clothing is contaminated with flammable materials. An increase in the oxygen content of the air will reduce considerably the protection of the welders' protective clothing against flame. Care should be taken when welding in confined spaces e.g. if it is possible that the atmosphere may become enriched with oxygen. The electrical insulation provided by clothing will be reduced when the clothing is wet, dirty, or soaked with sweat.

Protective clothing shall be cleaned regularly and after cleaning, the clothing shall be inspected for any sign of damage.

If users experience sunburn-like symptoms, UVB is penetrating and the garment should be repaired (if practicable) or replaced, and consideration given to the use of additional, more resistant, protective layers in future

EN ISO 11612  
2015



A1,B1,C1,F1

**EN ISO 11612:2015** - specifies performance requirements for protective clothing made from flexible materials, which are designed to protect the wearer's body, except the hands, from heat and/or flame. This standard applies where there is a need for clothing with limited flame spread properties and where the user can be exposed to radiant or convective or contact heat or to molten metal splashes.

**A: Limited flame spread**

If the garment is exposed to an open flame for 10 seconds, it should go out within 2 seconds and no hole should occur.

A1 - Surface ignition

A2 - Edge ignition

**B: Protection against convective heat (heat passage)**

Specifies how long the garment can stop the heat passing through the garment when exposed to an open flame.

B1: 4-10 sec

B2: 10-20 sec

B3: 20 sec or more

**C: Protection against radiant heat**

Specifies how long the garment can stop the heat passing through the garment when exposed to radiant heat.

C1: 7-20 sec

C2: 20-50 sec

C3: 50-95 sec

C4: 95 sec or more

**E: Protection against molten iron splash**

Specifies how much molten iron splash the garment can handle.

E1: 60-120 g

E2: 120-200 g

E3: 200 g or more.

**F: Protection against contact heat**

Specifies how long the garment can block the heat generated by direct contact with hot substances and objects.

F1: 5-10 sec

F2: 10-15 sec

F3: 15 sec or more

In the event of an accidental splash of chemical or flammable liquids on clothing, the wearer should immediately withdraw and carefully remove the garments, ensuring that the chemical or liquid does not come in contact with any part of the skin. The clothing shall then be cleaned or removed from service.

In the event of a molten metal splash the user shall leave the working place immediately and take off the garment.

In the event of a molten metal splash, the garment, if worn next to the skin, may not eliminate all risks of burns.

EN 61482-2  
2020



ELIM = 9.4 cal/cm<sup>2</sup>

**EN 61482-2-2:2020** Live working - Protective clothing against the thermal hazards of an electric arc - Part 2: Requirements. Test method used IEC 61482-1-1:2019 Protection against the thermal hazard of an electric arc in the form of convective and radiant energy (EN 61482-1-1:2019)

Arc thermal performance value (ATPV) refers to the energy level at which heat transfer through the protective equipment is enough to give 50% probability of a second-degree burn. Breakopen threshold energy (EBT) refers to the energy level at which there is 50% probability of breakopen occurring. The incident energy limit (ELIM) refers to the energy level that protective equipment can be exposed to with a 0% probability of breakopen or second-degree burn.

**Open Arc Test Method:** This method provides a Calorific Value which is measured in ATPV (Arc Thermal Protection Value). The Open Arc test method can also give an EBT (Energy Breakopen Threshold). These results determine the level of heat a garment can withstand before it penetrates to the wearer. Protection can be increased by layering Arc Protective garments and the level of required protection being determined by individual risk assessments.

For EN 61482-2 the protective clothing is not intended to be used as electrical insulating protective clothing and does not provide protection against electrical shock

Protective clothing that becomes contaminated with grease, oil, flammable materials or combustible materials should not be used

Protective clothing should be cleaned when necessary -Protective clothing that is damaged to the extent that its protective qualities are impaired (e.g. holes in the garment, non-functioning closures) should not be used

For full body protection suitable additional protective equipment (helmet with protective face screen, protective gloves and boots) shall be used

Dirty protective clothing can reduce the protection

No garments like shirts, undergarments or underwear made of, for example, polyamide, polyester or acryl fibres which melt under arc exposures, should be used

RIS-3279-TOM



Issue 2:2019

RIS-3279-TOM issue 2:2019 (formerly GO-RT 3279) - **Rail industry standard for high visibility clothing.**

British rail industry standard for high-visibility clothing. All maintenance staff must wear orange high-visibility clothes when working on or near the railway tracks. Hence the properties of the fabric therefore need to fulfill certain minimum technical criteria for the fluorescent and reflective areas of the orange colour. RIS-3279-TOM must be combined with EN ISO 20471 to be valid.

We have our garment available in HiVis yellow and HiVis Orange (only the orange conforms to RIS-3279TOM).