



Multi-norm Protection

IEC61482-1-2/EN 61482-1-2 Test Method - Box Test



Arc Flash Protection

This test method supercedes ENV 50354 and is commonly referred to as the Box Test. There are two test methods – one for fabrics which includes heat transfer measurements and Stoll Curve Differential Analysis, and one for the finished garment which includes a visual assessment and performance of components. The Box Test method gives a protective classification of:

Class 1 – testing at an arc current of 4 kA and duration of 0.5s – Lower Level of Protection

Class 2 – testing at an arc current of 7 kA and duration of 0.5s – Higher Level of Protection

The current of the actual electrical arc event is usually lower than the fault current of the equipment. Unlike the ATPV Open Arc Test Method, the results of the Box Test are either a Pass or Fail and do not give a value of the incident energy. However, the Box Test method enables the garment to be CE certified to one of the two classifications (Class 1 or Class 2) according to the results.

This ATPV Test Method enable garments to be tested and certified to an actual ATPV value. There is no Pass/Fail result when compared to the Box Test method and the meaningfulness and reliability of the ATPV results, in regards of second degree burn predictions, is also higher. IEE1684 and NFPA 70E are the most commonly used guidelines for calculating incident energy levels in front of the assumed arc flash for each piece of equipment on your site and for each live working activity.

The Open Arc IEC61482-1-1 Test Method allows the wearer to specify confidently a protective garment with an ATPV value that is at least as high as the level established in their arc flash studies and risk assessments. In an ideal scenario, garments could be certified to both test methods. However, in the absence of this, it would be considered best practice to choose a garment that is CE certified to the Open Arc Test Method IEC61482-1-1 as this is the only method which can provide an ATPV value for both the fabric and as a complete garment.

ATPV or ELIM?

ELIM: Energy Limit Value

ATPV: Arc Thermal Performance Value

ELIM is the point at which the Arc Flash clothing gives 0% probability of the wearer receiving a second-degree burn while the ATPV measures the incident energy level where there is a 50% probability of the wearer receiving a second-degree burn injury.



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Key design requirements for Arc Flash Garments

IEC61482 Performance Standards

This IEC document contains information regarding the performance requirements for clothing designed to protect against the thermal hazards of an electric arc. It also details information on both test method options – the Open Arc ATPV and the Box Test.

- Garments should have long sleeves
- No exposed external metal shall be permitted in the clothing. If internal metal and/or melting parts are used they shall be covered to the inside to avoid skin contact.
- All parts of the garment shall be made of arc thermal materials.
- Sewing threads must be made of inherent flame-resistant fibres and shall not melt when tested at 260°C in accordance with the standard.
- The garment must have an ATPV of 4cal/cm² (167,5 kJ/m²) as a minimum according to IEC61482-1-1 or Class 1 according to IEC61482-1-2.

EN ISO 11612:2015 - Protective Clothing to Protect Against Heat and Flame

This standard specifies performance requirements for garments made from flexible materials, which are designed to protect the wearer's body (except the hands) from heat and/or flame. The performance requirements set out in EN ISO 11612:2015 are applicable to garments which could be worn for a wide range of end uses, where there is a need for clothing with limited flame spread properties and where the user can be exposed to radiant, convective or contact heat, or to molten metal splashes. The following parameters are used:

Code A1 – Limited flame spread to outer surface

Code A2 – Limited flame spread to edge

Code B – Convective heat

Code C – Radiant heat

Code D – Molten aluminium splash

Code E – Molten iron splash

Code F – Contact heat

EN ISO 14116:2015 - Protective Clothing to Protect Against Heat and Flame – Limited Flame Spread

This standard specifies the performance requirements for the limited flame spread properties of materials and protective clothing in order to reduce the possibility of the clothing burning and itself constituting a hazard. Protective clothing complying with EN ISO 14116:2015 is intended to protect workers against occasional and brief contact



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with small igniting flames, in circumstances where there is no significant heat hazard and without presence of another type of heat. When protection against heat hazards is necessary in addition to protection against limited spread flammability, then standards, such as EN ISO 11612, are more appropriate (see above).

EN ISO 11611:2015 - Protective Clothing for use in Welding and Allied Processes

To protect the wearer against small splashes of molten metal, short contact time with flame, radiant heat from the arc, and minimise the possibility of electrical shock by short-term, accidental contact with live electrical conductors at voltages up to approximately 100v in normal conditions of welding.

EN 1149-5:2018 - Protective Clothing - Electrostatic Properties - Part 5: Material Performance and Design Requirements

This European Standard specifies material and design requirements for electrostatic dissipative protective clothing, used as part of a total earthed system, to avoid incendiary discharges. The standard specifies three areas:

1. Performance requirements of materials
2. Design requirements
3. Marking and guidance



Read more on Clad Safety's Safety Standards Guide [here](#).