

ARC FLASH PROTECTION

IEC 61482 EXPLAINED

This standard is significantly different to FR standard EN ISO 11612. It includes more rigorous and different requirements, and is the standard for garments to protect those at risk of arc flash. The latest update to the standard was in 2018 and contained a couple of important changes to the test methods with regards to the performance ratings of garments.

SCOPE

(EXTRACT FROM THE
INTERNATIONAL
STANDARD)

This part of IEC 61482 is applicable to protective clothing used in work where there is the risk of exposure to an electric arc hazard. This standard specifies requirements and test methods applicable to materials and garments for protective clothing for electrical workers against the thermal hazards of an electric arc based on:

- Relevant general properties of the textiles, tested with selected textile test methods
- Arc thermal resistance properties

TEST METHODS

There are two test methods commonly referred to under the IEC 61482-2: 2018 European Standards: ProGARM garments are tested using both methods.

OPEN ARC TEST METHOD: IEC 61482-1-1

This test method gives a Calorific Value (cal/cm²) for each garment - expressed as an arc thermal protection value (ATPV), breakopen threshold energy value (EBT) or the incident energy limit (ELIM) and in this way, layered garment systems can be built up with testing results that correspond directly to your arc flash risk assessments.

BOX TEST METHOD: IEC 61482-1-2

This test method gives results of either 4kA (APC 1) or 7kA (APC 2) with APC 2 being a higher level of protection and is established in the European market. Garments in the ProGARM® collection do get APC/Class ratings, but the results cannot be directly related to Arc Flash Risk Assessments in the same way that Calorific Values can be in the Open Arc Test Method.

CALORIFIC VALUES

There are now 3 different calorific values given to a garment when it undergoes Open Arc Test Method: IEC 61482-1-1: 2019

ATPV

The maximum thermal energy the garment can withstand before the wearer would have a 50% probability of 2nd degree burns.

EBT50

The value of incident energy at which breakopen occurs with 50% probability

ELIM

The maximum thermal energy the garment can withstand with the wearer having a 0% probability of 2nd degree burns.

THE STOLL CURVE

The Stoll curve is used and analysed in open arc testing to provide a cal/cm^2 rating for the garment. Thus providing a protection rating that can be used to indicate the protection level of a garment and match up protection to the risk.



IEC 61482-2:
2018

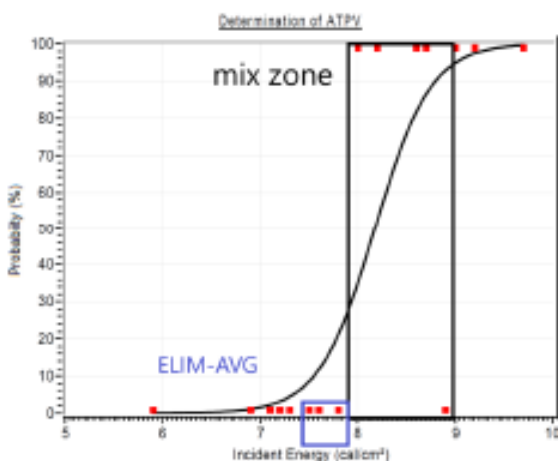
IEC 61482-2: 2018

LIVE WORKING – PROTECTIVE
CLOTHING AGAINST THE
THERMAL HAZARDS OF AN
ELECTRIC ARC

HOW DOES IEC 61482 USE THE STOLL CURVE? (EXCERPT FROM ARCWEAR.COM)

Standards use the Stoll Curve to determine the time and energy at which a garment or piece of equipment will prevent the influx of pain and second degree burn. This is represented by comparing a graph of the heat flux exposure time with the Stoll Curve. Their point of intersection is recorded as the heat flux at the time to second degree burn, and is reported as a rating of the transfer response through a material.

In arc flash testing, copper calorimeters behind the exposed fabric panel report the energy which passed through the material, and other uncovered calorimeters record the energy incident on the fabric. A conversion of conductivity from copper to the thermocouple is calculated to determine the expected human tissue reaction of the exposed energy and is compared to the Stoll Curve to determine the level of survivable burn (considered to be 50% probability of 2nd degree burns).



INFORMATION TAKEN FROM OFFICIAL STANDARD PUBLICATIONS AND GUIDANCE FROM ACCREDITED ARC FLASH TEST HOUSES.

DETERMINING CAL RATINGS

When arc flash testing is carried out, the cal rating is determined using at least 20 data points and a logistical regression to determine the incident energy level at which there's a 50% probability of 2nd degree burns (enough heat to cross the Stoll Curve) - ATPV, or for the material to breakopen - EBT.

From the graph on the right we can work out both the ATPV (50% burn probability) and the ELIM (Incident Energy Limit Value, 0% burn probability).

ATPV - This is calculated at the incident energy at which there is a 50% probability of 2nd degree burns (around 8.2cal/cm^2 in this instance).

ELIM - This is calculated by taking the average of the first 3 data points below the mix zone (the range in testing between the lowest incident energy level that crossed the Stoll Curve, and the highest incident energy level that did not cross the Stoll Curve), within blue box, which in this case is around 7.8cal/cm^2 .

You will see that most of the garments in our range are tested using the previous test methods (pre 2019) so won't have an ELIM value and will also refer to APC 1/2 as Class 1/2. Garments tested after August 2019 are tested to the new standards with the full range due to be retested by the end of 2020. If you have any questions regarding our products and the updated standards please get in touch.