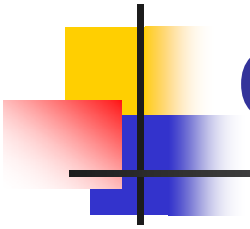
DEVELOPMENT MAINTENANCE AND USE

OF PROTECTIVE CLOTHING STANDARDS RELATED TO ARC FLASH PROTECTION

Hocine Krizou, ing.

14-10-07



Content

- Introduction
- Specification Standards
- Test Method Standards
- Development of a Standard
- Maintenance of a Standard

Introduction

- **In the PPE industry, there are two types of manufacturing standards :**

- The performance specification standards
- The test method standards

Specification standards

- These standards cover :
  - the materials used for basic protection levels;
  - the design characteristics;
  - the protective properties;

    (relating in our case to thermal exposure from the effects of an electrical arc)

Specification standards (contd)

- They provide performance properties for the materials, and fabrics used in the manufacture of wearing apparel and associated accessories.
- They are also used to evaluate and describe the properties of materials, products or assemblies in response to heat and flame under controlled laboratory conditions.
- They usually make reference to the test methods to be used to comply with the specification standards

Examples of Specification Standards

- **CAN/ULC 61482-2**, Live working – Protective clothing against the thermal hazards of an electric arc – Part 2 : Requirements;
- **ASTM F 1506**, a Standard Performance Specification for Flame Resistant Textile Materials for Wearing Apparels for use by Electrical Workers Exposed to Momentary Electrical Arc and Related Thermal Hazards;
- **ASTM F 1891**, Standard Specification for Arc and Flame Resistant Rainwear.

Test Method Standards

- The objective of the test methods is to obtain ratings according to certain criteria described in the methods
- We will find a complete description of the apparatus required for the tests along with
  - the specimen handling;
  - the test procedure;
  - the expected test results.

Examples of Test Method Standards

- **CAN/ULC 61482-1-1**, *Live working - Protective clothing against the thermal hazards of an electric arc - Part 1: Test methods - Method 1 - Determination of the arc rating (ATPV or EBT50) of flame resistant materials for clothing.*
- **ASTM F 1959**, *Standard Test Method for Determining the Arc Rating of Materials for Clothing.*

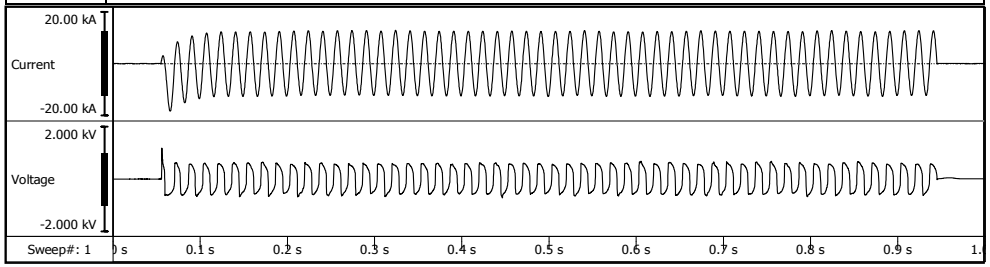
The above test methods are used to acquire an arc rating for a single or multilayer material used for the manufacture of protective clothing. Generally they are used by manufacturers to determine the arc rating of their products.

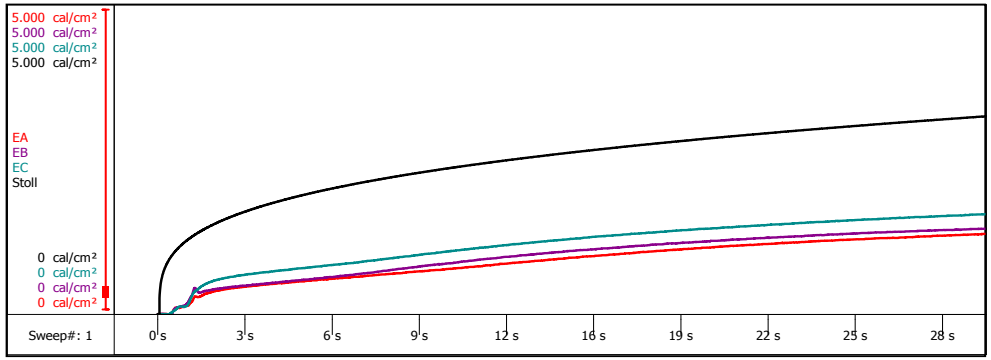
High Current Lab

Kinectrics Inc
800 Kipling Ave
Toronto, Ontario

Record #	K-418344-4575
Project #	K-418344 Client: Hydro Quebec

Standard:	ASTM F1959/F1959M-06ae1 Standard Test Method for Determining the Arc Rating of Materials for Clothing
Var. to Std:	Limited number of samples
Fabric	Nomex
	- - -
	- - -
	- - -
	- - -





Current Total RMS	8.117 kA	Panel A:	Panel B:	Panel C:
Current Peak	16.88 kA	Ei = 38.7 cal/cm²	Ei = 37.1 cal/cm²	Ei = 39.6 cal/cm²
Arc Voltage	445.5 V	SCD = -1 cal/cm²	SCD = -0.86 cal/cm²	SCD = -0.9 cal/cm²
Duration (cycles)	53.23 cycles	HAF = 96.6 %	HAF = 96.2 %	HAF = 95.9 %
Duration (time)	886.9 ms			
Arc Energy	2.957 MJ	Date (mm/dd/yyyy)	8/22/2011	

Examples of Test Method Standards (contd)

- **ASTM F 2621,** *Standard Practice for Determining Response Characteristics and Design Integrity of Arc Rated Finished Products in an Electric Arc Exposure.*
- This test method is not very well known even though it is one of the most useful to the user. It is used to evaluate the level of protection offered by a finished garment, the way it is worn in the field. It gives hints of how the garment should be worn to provide a maximum of protection (garment design, sizing and fit, coverage of the body, sewing thread, zippers design, heraldry, etc.).
- The method is also used to evaluate the interface between the protective clothing and the other PPE, such as balaclava, hood, visor, gloves, etc.

Development of a Standard

How do we know that we need to develop a certain standard.

- The request could come from :
  - an individual;
  - the industry;
  - other standards such as ULC s801 and CSA z462;
  - safety and health institutions (CDN, US or OTHER).

Development of a Standard (contd)

- The Request goes through various channels:
  - The Exec. Committee;
  - The main committee (vote);
  - The Sub-Committee (creation of task group to take care of the development of the standard).

The content of the standard and of course the time it would take to complete the work depend on the sub and main committee members.

Maintenance of a standard

- New scientific breakthrough, an error in the standard or just the need to add additional content, might bring up the need to revise a standard;
- Normal maintenance frequency (3 to 5 years);
- In any case, the sub-committee members will have to vote on whether a revision is needed or not.

Maintenance of a standard (contd)

- Once it is decided that a revision is necessary, the steps are the same as for the development of a new standard, as are the hardships and politics.