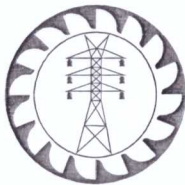


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CEB  
SPECIFICATION

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**ARC FLASH PROTECTIVE CLOTH  
(AFPC)**



CEYLON ELECTRICITY BOARD  
SRI LANKA



# Contents

1.0	SCOPE .....	3
2.0	SYSTEM PARAMETERS .....	3
3.0	SERVICE CONDITIONS .....	3
4.0	APPLICABLE STANDARDS .....	3
5.0	BASIC FEATURES .....	4
6.0	REQUIREMENTS FOR SELECTION .....	6
7.0	INFORMATION TO BE FURNISHED WITH THE OFFER .....	7
8.0	SAMPLE .....	7
9.0	TRAINING .....	7
10.0	PACKING AND MARKING .....	7
11.0	ANNEX .....	8
	Annex A- SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR AFPC...	9
	Annex B - NON-COMPLIANCE SCHEDULE .....	10



## SPECIFICATION FOR ARC FLASH PROTECTIVE CLOTH (AFPC)

### 1.0 SCOPE

This specification covers the requirements of the supply and delivery of Arc Flash Protective Cloth with minimum arc rating as follows:

1. Arc Flash PPE Category 1, Minimum Arc Rating of 4 cal/ cm<sup>2</sup>
2. Arc Flash PPE Category 2, Minimum Arc Rating of 8 cal/ cm<sup>2</sup>
3. Arc Flash PPE Category 3, Minimum Arc Rating of 25 cal/ cm<sup>2</sup>
4. Arc Flash PPE Category 4, Minimum Arc Rating of 40 cal/ cm<sup>2</sup>

The procurement entity shall select the suitable arc flash category by performing calculations, for maximum possible incident energy in accordance with IEEE 1584 considering fault level, fault clearing time and minimum working distance for the location where the AFPC is used.

After performing the necessary calculations as above, the procurement entity shall prescribe the relevant Arc Flash PPE category and relevant component sizes in the price schedule.

### 2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	400 V	11 kV	33 kV
(b)	System highest voltage (Um)	440V	12 kV	36 kV
(c)	System frequency	50 Hz		
(d)	Number of phases	03		

### 3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Maximum ambient temperature	40 °C
(c)	Maximum relative humidity	90%
(d)	Solar Radiation	4.5 kWh/m <sup>2</sup> /day
(e)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(f)	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(g)	Isokeraunic (Thunder days) level	100 days

### 4.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.



(a)	ASTM F1959/F1959M	Standard Test Method for Determining the Arc Rating of Materials for Clothing
(b)	ASTM F1506	Standard Performance Specification for Flame Resistant and Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs
(c)	NFPA 70E	Standard for Electrical Safety in the Workplace

Material conforming to other International Standards which are not less stringent than the Standards stipulated above may be offered. When such alternative Standards are used, reference to such Standards shall be quoted and English language copies of such Standards shall be provided with the offer.

**However, in the event of discrepancy, details given in this CEB specification supersede above standards.**

## 5.0 BASIC FEATURES

### 5.1 General

Clothing and equipment that provide worker protection from shock and arc flash hazards shall be used. Arc-rated clothing shall cover associated parts of the body as well as all flammable apparel while allowing movement and visibility.

Clothing and equipment required for the degree of exposure shall be permitted to be worn alone or integrated with flammable, non-melting apparel. Garments that are not arc rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system.

Informational Note: Protective clothing includes shirts, pants, coveralls, jackets, and parkas worn routinely by workers who, under normal working conditions, are exposed to momentary electric arc and related thermal hazards. Arc-rated rainwear worn in inclement weather is included in this category of clothing.

(a) **Layering.** Non-melting, flammable fiber garments shall be permitted to be used as underlayers in conjunction with arc-rated garments in a layered system. If non-melting, flammable fiber garments are used as underlayers, the system arc rating shall be sufficient to prevent break-open of the innermost arc-rated layer at the expected arc exposure incident energy level to prevent ignition of flammable underlayers. Garments that are not arc-rated shall not be permitted to be used to increase the arc rating of a garment or of a clothing system.

(b) **Outer Layers** Garments worn as outer layers over arc-rated clothing, such as jackets or rainwear, shall also be made from arc-rated material.





- (c) **Underlayers** - Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric underlayers.

*Exception: An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted.*

- (d) **Coverage** - Clothing shall cover potentially exposed areas as completely as possible. Shirt and coverall sleeves shall be fastened at the wrists, shirts shall be tucked into pants, and shirts, coveralls, and jackets shall be closed at the neck.
- (e) **Fit** - Tight-fitting clothing shall be avoided. Loose-fitting clothing provides additional thermal insulation because of air spaces. Arc-rated apparel shall fit properly such that it does not interfere with the work task.
- (f) **Interference** - The garment selected shall result in the least interference with the task but still provide the necessary protection. The work method, location, and task could influence the protective equipment selected.

## 5.2 Arc Flash Protective Equipment

The following Arc flash PPE shall be provided for relevant arc rating as applicable.

- (a) **Arc Flash Suits** - Arc Flash suit design shall permit easy and rapid removal by the wearer. The entire arc flash suit, including the hood's face shield, shall have an arc rating that is suitable for the arc flash exposure. When exterior air is supplied into the hood, the air hoses and pump housing shall be either covered by arc-rated materials or constructed of non-melting and nonflammable materials.
- (b) **Head Protection** - An arc-rated hood or an arc-rated balaclava with an arc-rated face shield shall be provided if requested and shall have an arc rating suitable for the arc flash exposure specified.
- (c) **Face Protection** - Face shields shall have an arc rating suitable for the arc flash exposure specified. Face shields with a wrap-around guarding to protect the face, chin, forehead, ears, and neck area shall be used. Face shields without an arc rating shall not be used.
- (d) **Hand Protection** - Insulating rubber gloves shall be provided along with leather protectors.
- (e) **Foot Protection** - Heavy-duty leather footwear shall be provided for arc flash protection to the feet.



### 5.3 Clothing Material Characteristics.

Clothing consisting of fabrics, zipper tapes, and findings made from flammable synthetic materials that melt at temperatures below 315° (600°F), such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, either alone or in blends, shall not be used.

*Exception: Fiber blends that contain material that melt, such as acetate, acrylic, nylon, polyester, polyethylene, polypropylene, and spandex, shall be permitted if such blends in fabrics are arc rated and do not exhibit evidence of melting and dripping during arc testing.*

## 6.0 REQUIREMENTS FOR SELECTION

### 6.1 Quality Assurance

The manufacturer shall possess ISO 9001:2015 or latest Quality Assurance Certification valid throughout the delivery period of this bid, for the manufacture of arc flash protective cloth for the plant where manufacturing is being done. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

### 6.2 Manufacturing Experience

The manufacturer shall have a minimum of eight (8) years of experience in manufacturing arc flash protective cloth. In addition, a minimum of five (5) years of experience shall be in manufacturing for orders from outside the country of the manufacturer. The product offered has to be in same voltage range of offered item and shall have been used in service utilities over past 5 years.

The manufacturer shall furnish a list of purchasers with year & quantity of the product offered and details of contact person with the offer to prove his manufacturing experience.

### 6.3 Type Tests

Available Type Test Certificates conforming to the relevant standards in clause 4 or any other standard which is not less stringent obtained from **accredited independent testing laboratory acceptable to the CEB** shall be furnished with the offer. Type Test Certificates shall clearly indicate the relevant standard, items concerned, showing the manufacturer's identity, type No. /catalogue No. and basic technical parameters.

Proof of accreditation by a national/ international authority shall be forwarded with the offer. Test certificates shall be complete including all the pages as issued by the testing authority. Type test certificates shall be in English language. Parts of test certificates shall not be acceptable.



## 7.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

- (a) A comprehensive catalogue on the clothing and equipment provided.
- (b) Type Test Certificates in accordance with the clause 6.3.
- (c) Duly filled and signed the relevant annexes.
- (d) Documents to prove manufacturer's experience in accordance with Clause 6.2.
- (e) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.
- (f) Information on Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing.

## 8.0 SAMPLE

Returnable samples of **Arc Flash Protective Cloth for requested arc ratings** shall be furnished with the offer. While analyzing samples, purchaser reserves the right to inspect workmanship and perform essential tests as prescribed in relevant standards.

## 9.0 TRAINING

Supplier shall agree to conduct a demonstration on instruction for use and on storage. The method of demonstration shall be agreed between CEB and the supplier.

## 10.0 PACKING AND MARKING

### 10.1 Packing

Arc flash protection equipment shall be packed in a watertight bag for easy carrying.

### 10.2 Identification and Labeling

Arc flash protection equipment shall carry a label identifying the following.

- (a) PPE category and Arc Rating
- (b) Manufacturer's identification.
- (c) Number and year of standard adopted.
- (d) Year of Manufacture.



## 11.0 ANNEX

Annex A – Schedule of guaranteed technical particulars for ATPV (Minimum arc rating 40 cal/ cm<sup>2</sup>)

Annex B – Non-Compliance Schedule





**Annex A- SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR AFPC**

	Item	CEB requirement	Offered
1	Manufacturer's Name		
2	Model No/Type		
3	Country of origin		
4	Applicable Standards		
5	ATPV (Minimum arc rating)	4 / 8 / 25 /40 cal/cm <sup>2</sup> as per the price schedule	
<b>Arc Flash Protective Equipment Required:</b>			
6	Arc rated Overall	Required	
7	Arc rated arc flash suit hood	Required	
8	Insulating hand gloves with leather over gloves	Required Insulating Glove Class - Class 0 (<1000V) - <input type="checkbox"/> Class 2 (<17000V) - <input type="checkbox"/> Class 4 (<36500V) - <input type="checkbox"/>	
9	A carrying bag	Required	
10	Size	As per the price schedule	
11	Year and Month/Quarter of Manufacture	Manufactured within a year before the bid closing date.	
12	Test Reports submitted	Required As per clause 6	
13	Quality Assurance for Manufacturer	As per clause 6	
14	Product catalogues, technical literature submitted	As per clause 7	
15	Information on the following should be submitted: Instructions for use, information on storage, shelf life, fitting and adjustment, handling, cleaning, disposal, periodic inspection, periodic testing	As per clause 7	
16	Ability to conduct a demonstration (free of charge)	Required As per clause 9	

.....  
Signature of the Manufacturer and seal

.....  
Date

I/We certify that the above data are true and correct

.....  
Signature of the Bidder and seal

.....  
Date



**Annex B - NON-COMPLIANCE SCHEDULE**

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....  
Signature of the Manufacturer

.....  
Date

I/We certify that the above data are true and correct

.....  
Signature of the Bidder and seal

.....  
Date

