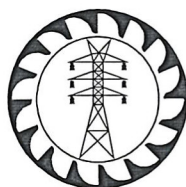


059: 2020

CEB
SPECIFICATION

12kV/36kV EXPULSION FUSE LINKS



**CEYLON ELECTRICITY BOARD
SRI LANKA**



CONTENTS

	Page
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	4
7.0 INFORMATION TO BE FURNISHED WITH THE OFFER	6
8.0 PERFORMANCE GUARANTEES AND WARRANTY	6
9.0 SAMPLE	6
10.0 PACKING AND MARKING	6
11.0 INSPECTION AND TESTING	8
12.0 ANNEX	8
Annex- A: Schedule of Technical Requirements and Guaranteed Technical Particulars	9
Annex -B: Non-Compliance Schedule	10



SPECIFICATION FOR 12kV/36kV EXPULSION FUSE LINKS

1.0 SCOPE

This specification covers the design, manufacture and testing of following types of Expulsion Fuse Links for Expulsion Fuse Switches (Drop Down Lift Off Switches).

1. 12kV / 36kV Expulsion Fuse Links – Fast Blowing (K) Type – UNF Thread
2. 12kV / 36kV Expulsion Fuse Links – Fast Blowing (K) Type – Metric Thread
3. 12kV / 36kV Expulsion Fuse Links – Slow Blowing (T) Type– UNF Thread
4. 12kV / 36kV Expulsion Fuse Links – Slow Blowing (T) Type– Metric Thread

Procurement entity shall prescribe relevant voltage and current rating in the price schedule.

2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	11 kV	33 kV
(b)	System highest voltage (Um)	12 kV	36 kV
(c)	System frequency	50 Hz	
(d)	Method of earthing	Effectively earthed	Non-Effectively earthed
(e)	System faults level	12.5 kA	16 kA

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 ² /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

Since majority of the locations are situated below 1000 m, for the material selection operation altitude is selected as 1000m.

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)	IEC 60282-2:2008	High Voltage Fuses - Expulsion fuses
(b)	IEEE C37-42	IEEE Standard Specifications for High Voltage (>1000 V) Fuses and Accessories

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

The Expulsion Fuse Links shall be of Class A as per IEC 60282-2. It shall consist of a Conductor (Tail), Current Responsive Element (Fuse) and Head which shall be suitable to be used with the medium voltage 12kV and 36kV expulsion fuse switches. They shall have sufficient mechanical strength against shock loading of closing and effectively resist deterioration under normal climate condition.

The conductor shall be of tinned stranded flexible copper cable and diameter of the conductor shall be sufficient to prevent corona discharge and eventual breakdown due to ageing. Static and dynamic strength of the fuse link shall be as per IEC 60282-2.

The current responsive fuse element shall be made of silver/Silver Copper Alloy/Nickel Chromium alloy and enclosed with a suitable insulating sleeve having arc extinguishing properties.

The Expulsion Fuse links shall be of the removable button head pattern with screw of M6x1 for metric thread and 1/4" for UNF thread. It shall be fitted with 12.7mm diameter tinned copper head and in addition shall have 19.0 mm diameter removable tinned copper washers.

The minimum overall lengths of the Expulsion Fuse Links shall be 660mm and 787mm for 12kV and 36kV respectively.

5.2. Characteristics

The Expulsion Fuse links shall be of the **FAST BLOWING (K)** type or **SLOW BLOWING (T)** type as requested in the Schedule of Prices.

The performance characteristics of the type of Expulsion Fuse Links as requested in the schedule of prices shall be furnished as indicated below;

Melting Time/Current characteristics preferably at an ambient temperature of 30°C for;

- a) FAST BLOWING (K) type Fuse Links
- b) SLOW BLOWING (T) type Fuse Links

6.0 REQUIREMENTS FOR SELECTION

6.1. Quality Assurance

The manufacturer shall possess ISO 9001:2015 or latest Quality Assurance Certification for the design, manufacture and testing of 12kV/36kV Expulsion Fuse Links. The certificate shall valid throughout the delivery period of this bid. In the event the Fuse Links are manufactured in a plant under the licence of the manufacturer, the manufacturing plant shall possess ISO 9001:2008 or latest Quality Assurance Certificate for manufacturing and testing of Fuse Links.

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 minimum of ten (10) years experience in manufacturing Fuse Links for Medium Voltage Expulsion Fuse Switches. The product offered shall have been supplied and used in service utilities satisfactorily outside the country of manufacture over past 5 years.

The manufacturer shall furnish a list of Authorities/Utilities to Fuse Links were supplied during the past 5 years, indicating their names, addresses and contact details clearly. CEB reserves the right to communicate with Electricity supply authorities/utilities to whom Fuse Links have been supplied with regard to the performance of them.

If the manufacturer has supplied similar items to CEB for the last three (3) years with proven sales records; without any adverse performance records, such manufacturers will be exempted from above requirements.

6.3. Type Tests

Type Test Certificates conforming to the above referred standards or any other international standard which is not less stringent, issued by:

Either

- (a) an accredited independent testing laboratory acceptable to the CEB or
- (b) an accredited or independent testing laboratory acceptable to the CEB where the type tests have been witnessed by CEB or a reputed independent body acceptable to CEB

shall be furnished with the offer. Type Test Certificates shall clearly indicate the relevant standard, items concerned, showing the manufacturers identity, type No. /catalogue No. and basic technical parameters. In case if the submitted type tests are according to any other international standard which is not less stringent than the specified, then the copy of the used standard in English shall be submitted with offer.

Proof of accreditation and accredited scope 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.

Following Type Test Certificates conforming IEC 60282-2 or IEEE C37-42 for the offered item shall be furnished with offer. If type test certificates are given according to IEEE C37-42, the test objects should be tested for next higher voltage.

- (a) Dielectric tests
- (b) Temperature-rise tests
- (c) Breaking tests
- (d) Tests for time/current characteristics
- (e) Mechanical tests



- (f) Artificial pollution tests

7.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

- (a) Following technical details in English clearly identifying the offered items, but not limited to:
- (i) Comprehensive catalogues,
 - (ii) Time current characteristics for fuse-links
 - (iii) Constructional features, materials used and the relevant technical literature,
 - (iv) Overall dimensional drawings,
 - (v) Details of marking, incorporating the particulars called for,
 - (vi) Details about mechanical strength,
 - (vii) Schematic diagrams,
 - (viii) Calculations, graphs and tables
 - (ix) Operational literature.
- (b) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.
- (c) Manufacturer shall furnish a list of supplies with supplied item, purchaser (specifying address, contact persons, contact details and country), year & quantity to prove his manufacturing experience and outside the country sales in accordance with Clause 6.2.
- (d) Type Test Certificates in accordance with the clause 6.3.
- (e) Duly filled and signed 'Annex - A: Schedule of Technical Requirements and Guaranteed Technical Particulars'.

8.0 PERFORMANCE GUARANTEES AND WARRANTY

Manufacturer shall provide 1 year warranty to CEB for the items and accessories from the date of delivery to CEB stores. Manufacturer should forward the duly signed Warranty Certificate together with the letter of acceptance of the award.

9.0 SAMPLE

Samples of 12kV and 36kV Expulsion Fuse Links, two for each current rating offered, shall be furnished with the offer. While analyzing samples, purchaser reserves the right to check dimensions, inspect workmanship and perform essential tests as prescribed in relevant standards.

10.0 PACKING AND MARKING

10.1. Packing

Each fuse link shall be enclosed in sealed polythene covers as indicated below;

- a) The **Fast Blowing 'K'** type fuse links shall be enclosed in **"BLUE"** coloured sealed polythene covers and the following information shall be indelibly marked on the polythene cover for easy identification purpose.



- | | |
|---------------------------------------|------------------------------|
| i. Rated Voltage | kV |
| ii. Rated continuous current | A |
| iii. Type | Fast Blowing "K" |
| iv. Manufacturers identification code | - |
| v. Breaking capacity | kA |
| vi. Thread type of the removable head | UNF / Metric (as applicable) |

- b) The **Slow Blowing 'T'** type fuse links shall be enclosed in "**RED**" coloured sealed polythene covers and the following information shall be indelibly marked on the polythene cover for easy identification purpose.

- | | |
|--|------------------------------|
| i. Rated Voltage | kV |
| ii. Rated continuous current | A |
| iii. Type | Slow Blowing "T" |
| iv. Manufacturers identification code | - |
| v. Breaking capacity | kA |
| vii. Thread type of the removable head | UNF / Metric (as applicable) |

- c) Ten numbers of fuse links of the same current and voltage rating (each enclosed in sealed polythene covers as per clause 7.4.1) shall be packed in cardboard boxes and box shall be clearly marked with the following information.

- | | |
|--|------------------------------|
| i. Name of manufacturer | - |
| ii. Country of manufacture | - |
| iii. Rated continuous current | A |
| iv. Rated Voltage | kV |
| v. Type | Fast 'K'/Slow 'T' |
| vi. Thread type of the removable head | UNF / Metric (as applicable) |
| vii. Manufacturer's identification code or Catalogue No. | |
| (height of the letters shall not be less than 15mm) | |

10.2. Marking

The fuse links shall be indelibly marked with the following information.

- | | |
|---------------------------------------|-----|
| a) Rated continuous current | A |
| b) Type (Fast 'K' - Slow 'T') | K/T |
| c) Manufacturer's identification code | - |



- d) Breaking capacity at rated voltage kA

11.0 INSPECTION AND TESTING

11.1. Routine Tests

The Tests done for main components during manufacturing and assembling shall form the Routine Test certificate. It shall be furnished for the observation of the Engineer appointed by CEB at the time of inspection. In addition, the routine test certificates shall be sent with the shipment.

11.2. Inspection

The Successful bidder shall make necessary arrangements for inspection by an Engineer appointed by the CEB and also to carry out in his presence necessary Acceptance tests on equipment and material. CEB may waive off the inspection with the condition of witnessing the acceptance tests by an independent testing authority acceptable to CEB. In such a situation a notice of waive off will be issued in advance to the supplier.

11.3. Acceptance Tests

The following test as per IEC 60282-2 shall be witnessed by the representative of CEB.

- (a) Dimensional Verification
- (b) Measurement of resistance of fuse-links
- (c) Dielectric tests
- (d) Mechanical Tests

12.0 ANNEX

Annex – A: Schedule of Technical Requirements and Guaranteed Technical Particulars

Annex – B: Non-Compliance Schedule



Annex- A

SCHEDULE OF TECHNICAL REQUIREMENTS AND GURANTEED TECHNICAL PARTICULARS
(Following Information shall be furnished with the offer for each rating)

			Offered
1.	Name of Manufacturer & Country of Origin		
2.	Model/Catalogue No		
3.	Rated voltage	kV	
4.	System highest voltage	kV	
5.	Rated continuous current	A	
6.	Rated frequency	Hz	
7.	Thread Type and Diameter		
8.	Diameter of Button Head Cap	mm	
9.	Material of Button head cap		
10.	Diameter of removable washer	mm	
11.	Material of button head cap		
12.	Material of current responsive element		
13.	Does the current responsive fuse element enclosed with an insulating sleeve having arc extinguishing properties	Yes/No	
14.	Material of insulating sleeve enclosure		
15.	Diameter of flexible conductor	mm	
16.	Material of flexible conductor		
17.	Whether the flexible conductor is tinned type	Yes/No	
18.	Overall length of the fuse link	mm	
19.	Tensile withstand strength	kg	
20.	Whether the ISO 9001: 2015 or latest certification furnished as per clause 6.1?	Yes/No	
21.	Whether evidence for manufacturing experience as per clause 6.2 provided?	Yes/No	
22.	Whether Type Tests as per clause 6.3 provided?	Yes/No	
23.	Whether information as per clause 7.0 is provided with the offer?	Yes/No	

.....
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