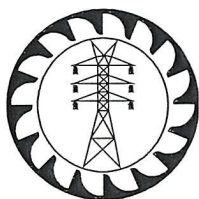


008: 2019

CEB SPECIFICATION

12kV/36kV FUSE CUTOUTS (DDLO)

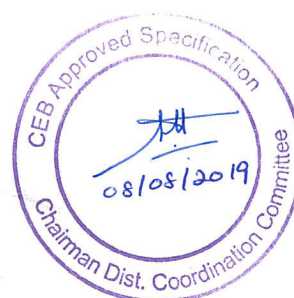


**CEYLON ELECTRICITY BOARD
SRI LANKA**



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SPECIFICATION FOR FUSE CUTOUTS

1.0 SCOPE

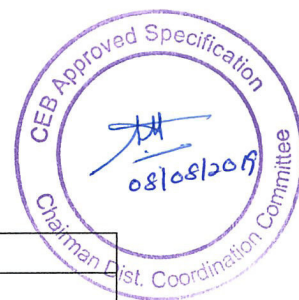
This Specification covers the general requirements of the design, manufacture, testing supply and delivery of following types of Fuse Cutouts complete with fuse carriers/isolating blades and mounting brackets;

- A. 12kV / 36kV, 100A rated Fuse Cutouts with insulators of standard/extended creepage, complete with fuse carrier.
- B. 12kV / 36kV, 400A rated Fuse Cutouts with insulators of standard/extended creepage, complete with isolating blade.
- C. 12kV / 36kV, 100A rated fuse carrier.
- D. 12kV / 36kV, 400A rated isolating blade.

Required voltage and creepage type will be mentioned 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

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)	IEC 60071-1 (2006)	Insulation co-ordination.- Part I Definitions, principles and rules
(c)	IEC 60071-2 (1996)	Insulation co-ordination – Part 2 – Application guide
(d)	IEC 60273 (1990)	Characteristic of indoor & outdoor post insulators for systems with nominal voltages greater than 1000V.

(e)	IEC 61952(2008)	Insulators for overhead lines - Composite line post insulators for A.C. systems with a nominal voltage greater than 1000 V - Definitions, test methods and acceptance criteria
(f)	IEC 60694 (2002)	Common Specifications for high-voltage switchgear & control gear standards
(g)	IEC 60060-2 (1994)	High-voltage test techniques -Part 2 Measuring systems

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

5.0 BASIC FEATURES

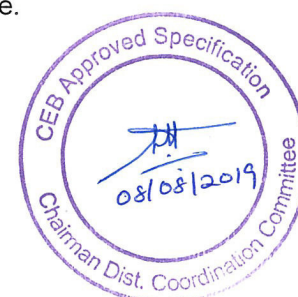
5.1. Minimum Technical Requirements

(a)	Rated Voltage	kV	12	36
(b)	Rated Frequency	Hz	50	
(c)	Rated continuous current (minimum)	A	100 or 400 as selected	
(d)	Insulation level: Dry Impulse withstand (1.2kV/50µs) voltage (positive & negative polarity) (peak)			
	(i) Across the isolating distance of the fuse base	kV	85	195
	(ii) To earth and between poles	kV	75	170
(e)	Wet Power frequency withstand voltage (rms.)			
	i) Across the isolating distance of the fuse base	kV	32	80
	ii) To earth and between poles	kV	28	70
(f)	Total creepage distance(min) – for standard creepage	mm	240	720
(g)	Total creepage distance(min) – for extended creepage	mm	360	900
(h)	Creepage factor		<4	
(i)	Mounting angle (to vertical plane)	deg	15 ~20	15 ~20
(j)	Interrupting rating			
	(i) Symmetrical interrupting rating (minimum) rms.	kA	8.0	6.8
	(ii) Asymmetrical interrupting rating (minimum) rms.	kA	9.6	10.0
	(iii) X/R Ratio		4.0	12.0

5.2. General Design Requirements

The Fuse Cutouts shall be of Class A as per IEC 60282-2. It shall be suitable for use in outdoor circuits under tropical conditions stipulated in Clause 3.0 above. The fuse cutout shall be complying with the minimum technical requirements stipulated in Clause 5.1 above.

- (a) The fuse cutout shall be designed with a solid core, bird proof, with insulator materials specified below;
- For standard creepage insulators: Polymer / Porcelain / Glass/ Silicon Rubber
 - For extended creepage insulators: Polymer/ Silicon Rubber
- (b) Fuse cutout should be able to withstand shocks due to frequent operations. The fuse carrier shall drop-out immediately following the blowing of the fuse.



- (c) Fuse cutouts within the same voltage class shall be so designed that fuse carrier together with mounting assembly shall be dimensionally compatible to facilitate the interchange of fuse carriers of the cutouts of corresponding rating.
- (d) The cutouts shall be able to mount on a single channel iron cross arm (100mm x 50mm x 6mm) at an angle of 15 to 20 degrees to the vertical plane. All mounting brackets and accessories shall be provided by the supplier. The whole unit shall be complete with long mounting bracket, bolts, nuts & washers etc. Detailed mounting arrangement shall be agreed upon the delivery without additional cost.
- (e) Fuse carrier shall be made of high strength fiberglass filament wound tube or suitable insulating material and it shall be protected from weather and environment by an ultraviolet resistant coating. Inside liner of the fuse tube shall be constructed of a synthetic arc quenching material.
- (f) Copper Arc Shortening rod shall be attached to the cap of the fuse tube to obtain higher interrupting rating. A removable button head type fuse link having M6x1 thread shall be able to fix to the arc shortening tube.
- (g) The installation and removal of the fuse carrier shall be facilitated by inserting the operating rod into a lifting eye at the hinge end (lower) of the fuse carrier when it is in the dropped out position. An operating lever eye shall be provided at the top of the carrier to facilitate a downward pull by the operating rod to release the latch incorporated in the stationary upper contact
- (h) All castings such as upper and lower moving and fixed contacts, clamp type terminals, toggle mechanism shall be of phosphor bronze, silicon bronze, aluminum bronze or Silver-plated brass.

5.3. Stationary and Movable Contacts

- (a) The Stationary and Movable Contact surfaces shall be silver plated to minimize the contact resistance.
- (b) The upper stationary contact assembly shall be provided with a safety latch to prevent the fuse carrier from dropping due to vibration and The upper contacts shall be protected from any airborne contaminants
- (c) A back up spring made out of stainless steel or phosphor bronze shall be provided to ensure constant pressure between the upper stationary contact and the upper movable contact of the fuse carrier.
- (d) The lower stationary contact support and the fuse carrier shall be machined at the swiveling or axle point to enable the fuse carrier with the fuse link to be correctly guided into the latching position by an operating rod. The hinge at the stationary contact shall be so designed to prevent the dropping off of the fuse carrier in the drop-out position, due to shock and vibration.
- (e) A suitable guiding arrangement shall be provided in the upper contact to ensure easy engagement of the fuse carrier.



- (f) The Asymmetrical breaking current ratings shall be permanently marked on the upper stationary metal part.
- (g) In case of isolating blades a solid copper/copper alloy blade with above mentioned features of contacts and hinges, withstanding to minimum 400A continuous current shall be supplied.

5.4. Terminals

- (a) The upper and lower terminals shall be suitable to accommodate Copper or Bi-metallic lugs terminating Copper/Aluminium Conductors of sizes from 5mm to 20mm diameter.
- (b) The upper terminal shall be positioned to receive the conductor from either side or upward direction while the lower terminal shall be able to receive the conductor from either side or downward direction.
- (c) The maximum temperature rise for contacts (movable and stationary) shall not be more than 40° C and, for terminals the temperature rise shall not be more than 30° C.

5.5. Galvanizing

All iron and steel parts such as mounting and support brackets, bolts and nuts, washers etc. shall be galvanized after processes such as sawing, shearing, drilling, punching, filling, bending and machining are completed. Galvanizing shall be the hot-dip process to comply with the standard BS EN 1461.

6.0 REQUIREMENTS FOR SELECTION

6.1. Quality Assurance

The manufacturer shall possess ISO 9001:2008 or latest Quality Assurance Certification for the design, manufacture and testing of Fuse Cut-outs. The certificate shall valid throughout the delivery period of this bid. In the event the Fuse Cut-outs 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 Cut-outs.

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 Cut-outs. 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 Cut-outs 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 Cut-outs 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.

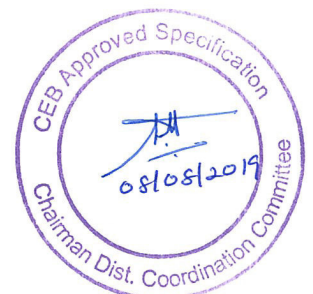
Following Type Test Certificates conforming IEC 60282-2 and IEC 60060 for the offered item shall be furnished with offer.

- | | |
|---|-----------------------------|
| (a) Dielectric tests | (clause 8.4 of IEC 60282-2) |
| (b) Temperature rise tests | (clause 8.5 of IEC 60282-2) |
| (c) Breaking tests | (clause 8.6 of IEC 60282-2) |
| (d) Mechanical Tests | (clause 8.8 of IEC 60282-2) |
| (e) Artificial Pollution Tests (for extended creepage type) | (clause 8.9 of IEC 60282-2) |

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) Constructional features, materials used and the relevant technical literature,
 - (iii) Overall dimensional drawings and separate dimensional drawing of the mounting arrangement, movable and stationary contacts, clamping terminals, toggle/tongue mechanism and insulator support.
 - (iv) Drawing of rating plate to scale, incorporating the particulars called for.
 - (v) Schematic diagrams,
 - (vi) Calculations, graphs and tables
 - (vii) 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 - B: 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

One sample of the model offered of the fuse cutout complete with fuse carrier/isolating blade and mounting bracket shall accompany the Bid to facilitate analysis and evaluation.

One sample of spare fuse carrier/isolating blade shall also be provided for each voltage rating offered. While analyzing samples, the purchaser reserves the right to check dimensions, inspect workmanship, and perform tests as prescribed in relevant Standards.

10.0 PACKING AND MARKING

10.1. Packing

The pre-assembled fuse unit (Fuse Base, Fuse Carrier and Mounting Bracket) shall be packed in a suitable hardboard box and the rated voltage of the unit shall be clearly marked on the box. Spare fuse carrier shall be supplied in suitable hardboard boxes, the quantity and the voltage rating applicable shall be clearly marked on the boxes.

All relevant drawings, technical literature, hand-books etc. required for installation, operation, and maintenance of the equipment, shall be supplied with the equipment. Test reports shall also be supplied with the equipment.

10.2. Marking

Marking of the Fuse Cutouts shall be as follows.

Rating Plate Marking

The ratings and data of the Cutout Fuse shall be provided in the rating plate, which shall be weather and corrosion proof.

The main rating plate near the supporting bracket of the insulator base shall carry the following information:

- (a) Name of manufacturer/Identification, Year of Manufacture and Warranty (Years)
- (b) Number and year of the Standard adopted



- (c) Rated voltage/Rated maximum current
- (d) Class designation/Manufacturer's name or trademark,
- (e) Asymmetrical current rating / Symmetrical current rating / X/R Ratio.

Marking on the Fuse Carrier and Isolating Blades.

- (a) Manufacturer's name or trademark
- (b) Rated Voltage / Rated frequency
- (c) Rated maximum current
- (d) Rated breaking capacity (Asymmetrical/Symmetrical current rating & X/R Ratio) – if applicable.

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) Dielectric tests
- (c) Mechanical Tests

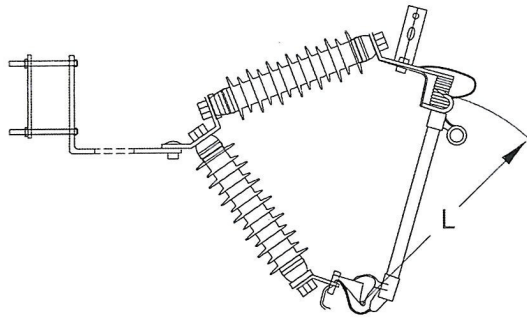
12.0 ANNEX

Annex – A: General arrangement of Fuse Cutouts

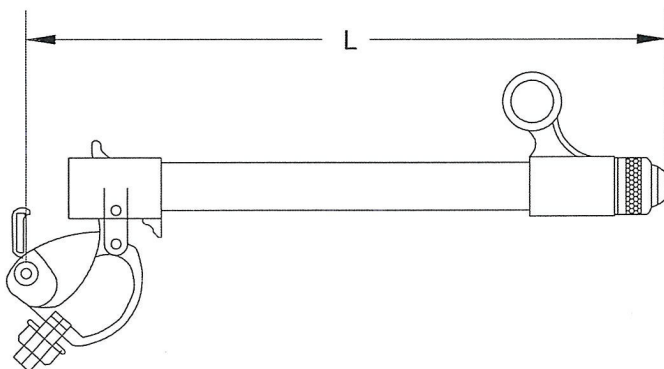
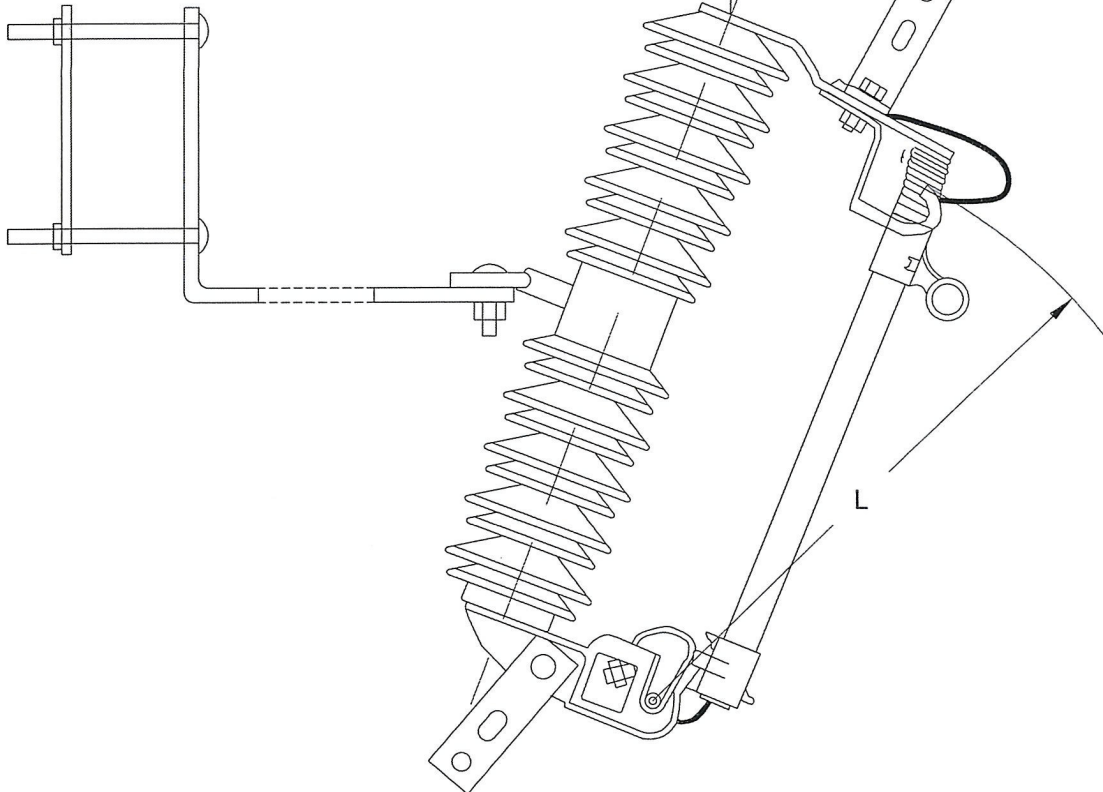
Annex – B: Schedule of Technical Requirements and Guaranteed Technical Particulars


Annex – C: Non-Compliance Schedule





An Alternative arrangement



 <p>CEYLON ELECTRICITY BOARD</p>	DISTRIBUTION STANDARDS & SPECIFICATIONS		SCALE : NOT TO SCALE
	12kV/36kV FUSE CUTOUT (DDLO)		DRAWN : HARSHA
	DESIGNED BY	APPROVED BY	DATE : JUL - 2019
			DRG. NO : DS&S/2019/008
	DISTRIBUTION COORDINATION BRANCH	EE (DC) CHAIRMAN, SPECIFICATION COMMITTEE	CAD NO :

Annex- B

SCHEDULE OF TECHNICAL REQUIREMENTS AND GURANTEED TECHNICAL PARTICULARS

(Following Information shall be furnished with the offer for each rating)

Offered item:			
			Offered
1.	Name of Manufacturer & Country of Origin		
2.	Class Designation		
3.	Model/Catalogue No		
4.	Rated voltage	kV	
5.	System highest voltage	kV	
6.	Rated continuous current	A	
7.	Rated frequency	Hz	
8.	Mounting Angle to the vertical	deg	
9.	Type, Size and Material of		
	i) Upper Terminal Clamps		
	ii) Lower Terminal Clamps		
	iii) Moving Contacts		
	iv) Fixed Contacts		
10.	Material of the insulator		
11.	Creepage distance of the insulator		
12.	Creepage factor		
13.	Temperature rise for Contacts		
	i) Upper	°C	
	ii) Lower	°C	
	Temperature rise for Terminals	°C	
	i) Upper	°C	
	ii) Lower	°C	
14.	Symmetrical / Asymmetrical (rms) interrupting rating at specified X/R ratio	kA	
15.	Insulation level Dry Impulse withstand voltage 1.2/50 μ s peak (positive & negative polarity)		
	i) Across the isolating distance of the fuse base	+kV -kV	
	ii) To earth and between poles	+kV -kV	
	Dry & Wet Power frequency (50 Hz) withstand voltage kV rms.		
	i) Across the isolating distance of the Fuse base - Dry	kV	
	Across the isolating distance of the Fuse base -Wet	kV	
	ii) To earth and between poles -Dry	kV	
	To earth and between poles -Wet	kV	
16.	Whether mounting bracket supplied as per drawing in Annex-A		
17.	Galvanizing thickness	mm	



18.	Whether removable button head type fuse link having M6x1 thread shall be able to fix to the arc shortening tube of fuse carrier?		
19.	Fuse carrier length/Blade length "L" as per drawing in Annex-A.		
20.	Whether the ISO 9001: 2008 certification furnished as per clause 6.1?		
21.	Whether evidence for manufacturing experience as per clause 6.2 provided?		
22.	Whether information as per clause 7.0 is provided with the offer?		

.....
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 – C****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