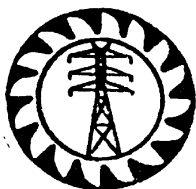


008: 2006

**CEB
SPECIFICATION**

EXPULSION FUSE CUT-OUTS



**CEYLON ELECTRICITY BOARD
SRI LANKA**

Specification

for

EXPULSION FUSE CUT-OUTS

CEB Specification 008: 2006

CEYLON ELECTRICITY BOARD

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EXPULSION FUSE CUT-OUTS

**The above specification is recommended
for acceptance**

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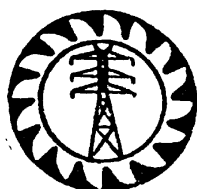
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**CEYLON ELECTRICITY BOARD
SRI LANKA**

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SPECIFICATION FOR EXPULSION FUSE CUT - OUTS

1.0 SCOPE

This specification covers the general requirements of the design, manufacture, testing, supply and delivery of 12 kV and 36 kV Expulsion Fuse Cutouts (Drop-out Fuses) complete with fuse carriers and mounting brackets.

2.0 SYSTEM PARAMETERS

(a)	Nominal Voltage	11kV	33kV
(b)	System highest Voltage	12kV	36kV
(c)	System frequency	50 Hz.	50 Hz
(d)	Number of phases	03	03
(e)	Method of earthing	Effectively earthed	Non effectively earthed
(f)	System faults level	13.1kA rms	13.1kA rms

3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Maximum ambient temperature	40 °C
(c)	Maximum relative humidity	90%
(d)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere.
(e)	Operational altitude	From M.S.L. to 1500 m above M.S.L.

4.0 APPLICABLE STANDARDS

The equipment and the components supplied shall be in accordance with the latest editions of the Standards specified below and amendments thereof. However the CEB Specification shall supersede these Standards in the event there is a discrepancy

(a)	IEC 60282-2 (1995)	H.V. Fuses - Expulsion and similar 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 60694 (2002)	Common Specifications for high-voltage switchgear & control gear standards
(e)	IEC 60060-2 (1994)	High-voltage test techniques -Part 2 Measuring systems
(f)	BSEN1461 (1999)	Hot dip galvanized coatings on iron and steel articles.

5.0 MINIMUM TECHNICAL REQUIREMENTS

(a)	Rated Voltage	kV	12	36
(b)	Rated Frequency	Hz	50	50
(c)	Rated continuous current	A	100	100
(d)	Insulation level: Dry Impulse withstand (1.2kV/50 μ s) 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
	Wet 1 min. 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
(e)	Total creepage distance(min)	mm	240	720
(f)	Mounting angle (to vertical plane)	deg	15 ~20	15 ~20
(g)	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

NOTE : The minimum values of wet power frequency 50 Hz withstand voltages for 01 minute (one) duration should be as stipulated in Table 4 of IEC 60282-2.

6.0 BASIC FEATURES

6.1. General

The Expulsion Fuse Cutouts shall be of Class A as per IEC 60282-2 It shall be suitable for use in out door circuits under tropical conditions stipulated in Clause 3.0 above. The Expulsion fuse shall be complying with the minimum technical requirements stipulated in Clause 5.0 above.

6.2. Design

- i) The Expulsion fuse shall be designed with a solid core, bird proof, one piece Porcelain Insulator and, it should robust enough to withstand shocks due to frequent operations. The fuse carrier shall drop-out immediately following the blowing of the fuse.
- ii) Expulsion fuses 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.
- iii) 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 The whole unit shall be complete with long mounting bracket, bolts, nuts & washers.
- iv) 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 a ultraviolet resistant coating. Inside liner of the fuse tube shall be constructed of a synthetic arc quenching material.

- v) 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.
- vi) 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
- vii) 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.

6.3. Stationary and Movable Contacts

- i) The Stationary and Movable Contact surfaces shall be silver plated to minimize the contact resistance.
- ii) 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
- iii) 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.
- iv) 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.
- v) A suitable guiding arrangement shall be provided in the upper contact to ensure easy engagement of the fuse carrier.
- vi) The Asymmetrical breaking current ratings shall be permanently marked on the upper metal part.

6.4. Terminals

- i) The upper and lower terminals shall be of Bi-metallic type, suitable to accommodate Copper/Aluminium Conductors of Sizes from 5mm to 14mm diameter.
- ii) 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.
- iii) 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.

6.5. 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.

7.0 QUALITY ASSURANCE

The Manufacturer shall possess ISO 9001 Quality Assurance Certification for the manufacture of Expulsion Fuse Cut-outs for the plant where the Manufacture of Expulsion Fuse Cut-out is 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.

8.0 ADDITIONAL REQUIREMENTS

8.1. Rating Plate Markings

The ratings and data of the Expulsion 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) Number and year of the Standard adopted
- (b) Rated voltage/Rated maximum current
- (c) Class designation/Manufacturer's name or trademark,
- (d) Asymmetrical current rating / Symmetrical current rating / X/R Ratio.
- (e) Year of manufacture

The following information shall be marked on the fuse carrier.

- (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).

8.2. Spares

Supplier shall be able to provide complete spare fuse carriers indicated in the price schedule.. The manufacture's identification shall be clearly marked on the fuse carrier.

8.3. Packing

The pre assembled expulsion fuse unit (Expulsion 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.

9.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

9.1. The following information in the English Language shall be furnished with the offer.

- a) Catalogues describing the equipment and indicating the model number.
- b) Literature describing the operational and constructional features of the equipment and materials used for components
- c) Overall dimensional drawings and separate dimensional drawing of the mounting arrangement, movable and stationary contacts, clamping terminals, toggle/tongue mechanism and insulator support.
- d) Drawing of nameplate to scale, incorporating the particulars called for.
- e) Completed schedule of guaranteed technical particulars (Annex A).
- f) A list of names and addresses of the major purchasers of the Expulsion Fuses during past 5 years of the same Type/Model indicating the quantities supplied, time of delivery.

9.2. Type Test Certificates

The following Certificates of Type Tests carried out in accordance with the IEC 60282-2 and IEC 60060 at a reference frequency of 50 Hz where applicable shall be furnished with the offer.

ii)	Dielectric tests;		
iii)	Temperature rise tests;		
iv)	Artificial pollution tests		
v)	Mechanical Tests		
vi)	Breaking tests;	36 kV	12kV
	Symmetrical current rating	6.8 kA	8.0 kA
	Asymmetrical current rating	10 kA	9.6 kA
	X/R ratio	12	4.0

The Test Certificate shall indicate the name of the Manufacturer, Type, Model and the Serial Number of the equipment tested. The test certificates referred to, shall be from an **Accredited Independent Testing Authority acceptable to the Purchaser**.

Offers of Bidders who fail to furnish the particulars requested in Clause 9.1, 9.2 and sample as per Clause 10 shall be rejected.

10.0 SAMPLE

One sample of the model offered of the expulsion fuse unit complete with fuse carrier and mounting bracket shall accompany the Bid to facilitate analysis and evaluation.

One sample of spare fuse carrier 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.

11.0 INSPECTION AND TESTING

11.1. Inspection

The successful Bidder shall make necessary arrangements for inspection by an Engineer appointed by the Purchaser to carry out in his presence the necessary Sample / Acceptance tests on equipment and materials offered. Routine test reports as per IEC 60282-2 shall also be made available for the observation of the Inspector.

11.2. Sample / Acceptance Tests

The following Sample / Acceptance tests as per IEC 60282-2 shall be witnessed by the Representative of the Purchaser.

- (a) Dimensional Verification
- (b) Dielectric tests
- (c) Mechanical Tests

In the event the cost of carrying out the sample/acceptance test has to be borne by the purchaser, the bidder shall indicate the cost of such testing in the offer. These costs shall be added to the tender price for the purpose of tender evaluation.

12.0 TECHNICAL LITERATURE AND DRAWINGS

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

13.0 ANNEX

Annex A - Schedule of Guaranteed Technical Particulars (To be filled by the Bidders)

Annex B - Non Compliance Schedule (To be filled by the Bidders).

Annex C - Expulsion Fuse Cut-out (Drawing: No: P&D/R3/013).

ANNEX - A

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR EXPULSION FUSE CUTOUTS

(To be filled by the Bidder for each type)

			12 kV	36 kV
A	Name of Manufacturer & Country of Origin			
B	Class Designation			
C	Model/Catalogue No			
D	Rated Voltage	kV		
E	Rated continuous current	A		
F	Rated frequency	Hz		
G	Mounting Angle to the vertical	deg		
H	Type, Size and Material of			
	i) Upper Terminal Clamps			
	ii) Lower Terminal Clamps			
	iii) Moving Contacts			
	iv) Fixed Contacts			
I	Temperature rise for Contacts			
	1) Upper	°C		
	2) Lower	°C		
	Temperature rise for Terminals	°C		
	1) Upper	°C		
	2) Lower	°C		
J	Symmetrical / Asymmetrical (rms) interrupting rating at specified X/R ratio	kA		
K	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 and wet 1 min. 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		
L	Total creepage distance	mm		
M	Type of Mounting Bracket			
N	Galvanizing thickness	mm		

O	Type Test Certificates conforming to Clause 9.2 furnished	Yes/ No		
P	Whether quotation supplied for spare fuse carrier	Yes/ No		
Q	Whether the cost of sample/acceptance tests has to be borne by the Purchaser or Bidder			
			12 kV	36 kV
R	Whether the cost of sample/acceptance tests is Indicated in the Schedule of Prices, if the cost of same has to be borne by the Purchaser	Yes/ No		
S	Fuse Carrier Length "L" as per Drawing P&D/R3/013	mm		

Seal & Signature of the Manufacturer/Bidder

Date:

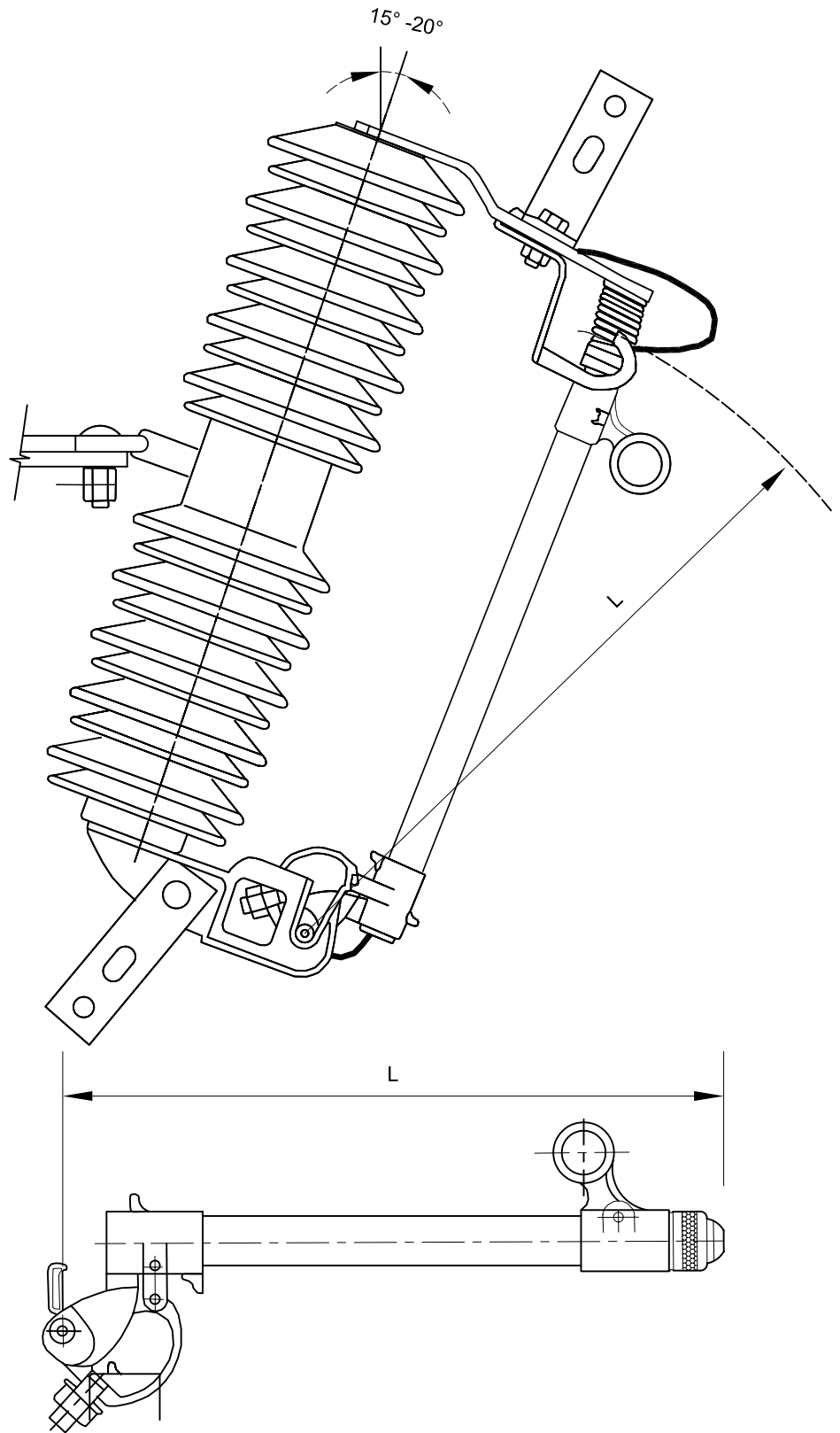
ANNEX - B**Non Compliance Schedule**


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's life and operating characteristics. Each non- compliance shall be referred to the relevant specification clause.

Clause No.	Non Compliance

Seal & Signature of the Manufacturer/Bidder

Date:



 <p>CEYLON ELECTRICITY BOARD</p>	CEB SPECIFICATION 008 : 2006		SCALE : NOT TO SCALE
	EXPULSION FUSE CUT-OUT (DDL O)		DRAWN : KUMARI
	CHECKED BY	APPROVED BY	DATE : NOV., 2006
			DRG. NO : P&D/R3/013
	PLAN. & DEV. BRANCH-R3	CHIEF ENGINEER (DS & S)	CHAIRMAN, SPECIFICATION COMMITTEE