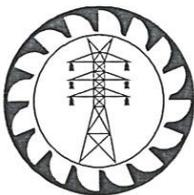


027: 2022

CEB  
SPECIFICATION

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## INDOOR AND OUTDOOR RING TYPE CURRENT TRANSFORMERS



CEYLON ELECTRICITY BOARD  
SRI LANKA



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## SPECIFICATION FOR INDOOR AND OUTDOOR RING TYPE CURRENT TRANSFORMERS

### 1.0 SCOPE

This Specification covers the general requirements of the design, manufacture, testing supply and delivery of low voltage, insulated;

1. Outdoor Ring Type Current Transformers.
2. Indoor Ring Type Current Transformers.

Current transformer ratios as per clause 5.1 (d) shall be mentioned in the price schedule.

### 2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	400 V
(b)	System highest voltage (Um)	440 V
(c)	System frequency	50 Hz
(d)	Method of earthing	Effectively earthed
(e)	System fault level	25 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 <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)	Isokeruanic (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 61869-1: 2007	Instrument transformers – Part 1: General requirements
(b)	IEC 61869-2: 2012	Instrument transformers – Part 2: Additional requirements for current transformers
(c)	IEC 60085: 2007	Electrical insulation - Thermal evaluation and designation

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

### 5.0 BASIC FEATURES

#### 5.1. General Design Requirements

- (a) The low voltage current transformer (CT) shall be of the bar primary type having a ring type core with wound secondary. The accuracy classes of the current transformers shall be as per the Technical Requirements stipulated in clause 5.2.

- (b) The current transformers to be used with Three Phase Four wire Programmable Static Energy Meter – CT connected.
- (c) The relative polarities shall be permanently marked on the current transformers as per IEC 61869. Brass bolts, nuts and spring washers shall be provided at the secondary terminals to accommodate 2.5 sqmm wire leads.
- (d) The standard rated transformation ratio and the burden of the current transformers shall be as stipulated below.

Primary Current (A)	Secondary Current (A)	Outdoor CT Burden (VA)	Indoor CT Burden (VA)
200	5	10	5
400	5	10	5
600	5	10	5
800	5	10	5
1000	5	10	5
1200	5	10	5
1600	5	10	5

- (e) The current transformers shall be designed and constructed in such a way as to avoid introducing any danger for normal use and under normal working conditions, so as to ensure personal safety against electric shock, effects of excessive temperature and it shall not produce noise.
- (f) The B.H curve and saturation characteristic of each type of offered current transformer shall be furnished with the offer.

#### 5.1.1. Design Requirements for Outdoor Ring Type Current Transformers

- (a) Outdoor, Ring Type Current Transformers shall be suitable for sliding on to the low voltage bushings of the MV distribution transformers.
- (b) The current transformer shall be of cast epoxy resin insulation or any other superior type suitable for operation in outdoor tropical climatic conditions as stipulated in Clause 3.0 above. The insulation shall be suitably treated to prevent deterioration due to ultra violet radiation of sunlight. The dielectric strength shall not be less than the stipulated in the Technical Requirements stipulated in clause 5.2.
- (c) The internal diameter and external diameter of the outdoor ring type current transformers shall be in accordance with the drawing no. DS&S/2017/027 in Annex A.
- (d) The secondary terminals of the current transformer shall be housed in a weather resistance and waterproof terminal box with rubber grommet to take out the CT leads.



### 5.1.2. Design Requirements for Indoor Ring Type Current Transformers

- (a) The indoor current transformer shall be of PVC tape insulation or any other superior type suitable for operation in tropical climatic conditions as stipulated in Clause 3.0 above and the dielectric strength shall not be less than that stipulated in the Technical Requirements stipulated in clause 5.2.
- (b) The internal diameter of the current transformers shall not be less than the value stipulated below;

Current Transformer Ratio (A)	Internal Diameter (mm)
200/5	45
400/5	75
600/5	75
800/5	80
1000/5	80
1200/5	90
1600/5	100

- (c) The secondary terminals of the current transformer shall be housed in a terminal box with sealing facilities to prevent access to unauthorised persons. The terminal box shall be provided with transparent cover to detect any tampered terminal connections.
- (d) Suitable steel foot stand with mounting holes of 6mm diameter shall be provided to facilitate mounting the current transformer to the meter board and it shall be suitably protected from corrosion by galvanizing / chrome plating or insulated.

### 5.2. Technical Requirements

(a)	Type	Ring (outdoor)	Ring (Indoor)
(b)	Nominal Voltage	400 V	400 V
(c)	System Highest Voltage	440 V	440 V
(d)	Frequency	50 Hz	50 Hz
(e)	Rated Power Frequency Withstand Voltage	3kV rms / 1 min	3kV rms / 1 min
(f)	Accuracy Class	0.5	0.5 S or 0.2 S as per the price schedule
(g)	Rated burden	10 VA	5 VA
(h)	Limits of current error and phase displacement	IEC 61869-2	IEC 61869-2
(i)	Primary/Secondary Current	As per Clause 5.1 (d)	As per Clause 5.1 (d)
(j)	Short time withstand current/ Duration	25kA/1 Sec	25kA/1 Sec
(k)	Minimum Thermal Class of the insulation (As per IEC 60085)	90 (Y)	90 (Y)



(l)	Type of Insulation	Cast Epoxy resin UV treated or superior	PVC Tape or superior
(m)	Terminal Box	Weather resistant and waterproof	Sealable terminal box with transparent cover
(n)	Rated continuous thermal current	120 %	120%
(o)	Instrument security factor	5	5

## 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 Low Voltage Measuring Current Transformers. The certificate shall valid throughout the delivery period of this bid. In the event the current transformers are manufactured in a plant under the licence of the manufacturer, the manufacturing plant shall possess ISO 9001:2015 or latest Quality Assurance Certificate for manufacturing and testing of Low Voltage Measuring Current Transformers.

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 measuring Current Transformers and at least five (5) years experience for relevant special Accuracy Classes if this purchase is intended. The product offered shall have been supplied and used in service utilities satisfactorily outside the country of manufacture over past 3 years.

The manufacturer shall furnish a list of Authorities/Utilities to whom current transformers were supplied during the past 10 years, indicating their names, addresses and contact details clearly. CEB reserves the right to communicate with Electricity supply authorities/utilities to whom meters have been supplied with regard to the performance of the meters.

If the manufacturer has supplied similar items to CEB for the last (5/3) 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 **an 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 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.

4 Following Type Test Certificates conforming IEC 61869-2 for the offered ratings of current transformers shall be furnished with offer.

- (a) Temperature-rise test
- (b) Wet test for outdoor type transformers
- (c) Tests for accuracy
- (d) Verification of the degree of protection by enclosures
- (e) Short time current 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) Constructional features, materials used and the relevant technical literature,
  - (iii) Complete dimensional drawings for all CT ratios offered,
  - (iv) The details of the information indicated as marking (Clause 10.2)
  - (v) Schematic diagrams,
  - (vi) Calculations, graphs and tables
  - (vii) Operational literature,
- (b) The BH curve and saturation characteristic of each type of transformer.
- (c) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.
- (d) Manufacturer shall furnish a list of supplies with supplied item, purchaser (specifying address contact persons and contact details, country), year & quantity to prove his manufacturing experience and outside the country sales in accordance with Clause 6.2.
- (e) Type Test Certificates in accordance with the clause 6.3.
- (f) 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 each offered current transformers shall be handed over to CEB along with the offer.



## 10.0 PACKING AND MARKING

### 10.1. Packing

Low Voltage Measuring Current Transformers (CT) shall be suitably packed in cardboard boxes to prevent damage during handling and transport. Each cardboard box shall contain three current transformers of the same CT ratio and the box shall be clearly marked with the relevant particulars of the CT. The cardboard boxes shall be packed again in a wooden box of (maximum size) 1m x 1m x 1m with wooden block base for forklift handling. Bio-degradable material shall be used for packing purposes.

#### 10.1.1. Technical Literature

Technical Literature in English Language on the installation, complete with necessary connection diagrams and drawings shall be supplied with the item and they shall be descriptive and self-explanatory. Routine test reports and inspection test reports shall also be supplied with the current transformers at the delivery.

### 10.2. Marking

Marking of the current transformers shall be as follows.

#### Rating Plate Marking

Every current transformer shall have a name plate indelibly marked with the following information;

- (a) Name of manufacturer/Identification, Year of Manufacture and Warranty (Years)
- (b) Type designation and Serial Number
- (c) Rated primary and secondary current
- (d) Rated frequency
- (e) Rated burden, accuracy class & instrument security factor
- (f) Rated voltage
- (g) Rated insulation level
- (h) Rated short-time current/duration & dynamic peak current
- (i) Word "CEB"

#### Terminal Marking

Following terminal marking shall be indelibly marked.

- (a) The primary and secondary windings
- (b) The relative polarities of windings and winding sections

## 11.0 INSPECTION AND TESTING

### 11.1. Routine Tests

The following Routine Tests shall be carried out on all Current Transformers as per IEC 61869-2 and the routine test report shall be submitted to the inspector appointed by the CEB at the time of inspection of the items.

- (a) Power-frequency voltage withstand test on secondary terminals
- (b) Test for accuracy
- (c) Verification of terminal markings and dimensions.
- (d) Inter-turn overvoltage test



### 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 61869-2 shall be witnessed by the representative of CEB.

- (a) Verification of markings and dimensions
- (b) Power frequency withstand voltage on secondary windings
- (c) Tests for accuracy
- (d) Determination of the instrument security factor (FS) of measuring current transformers

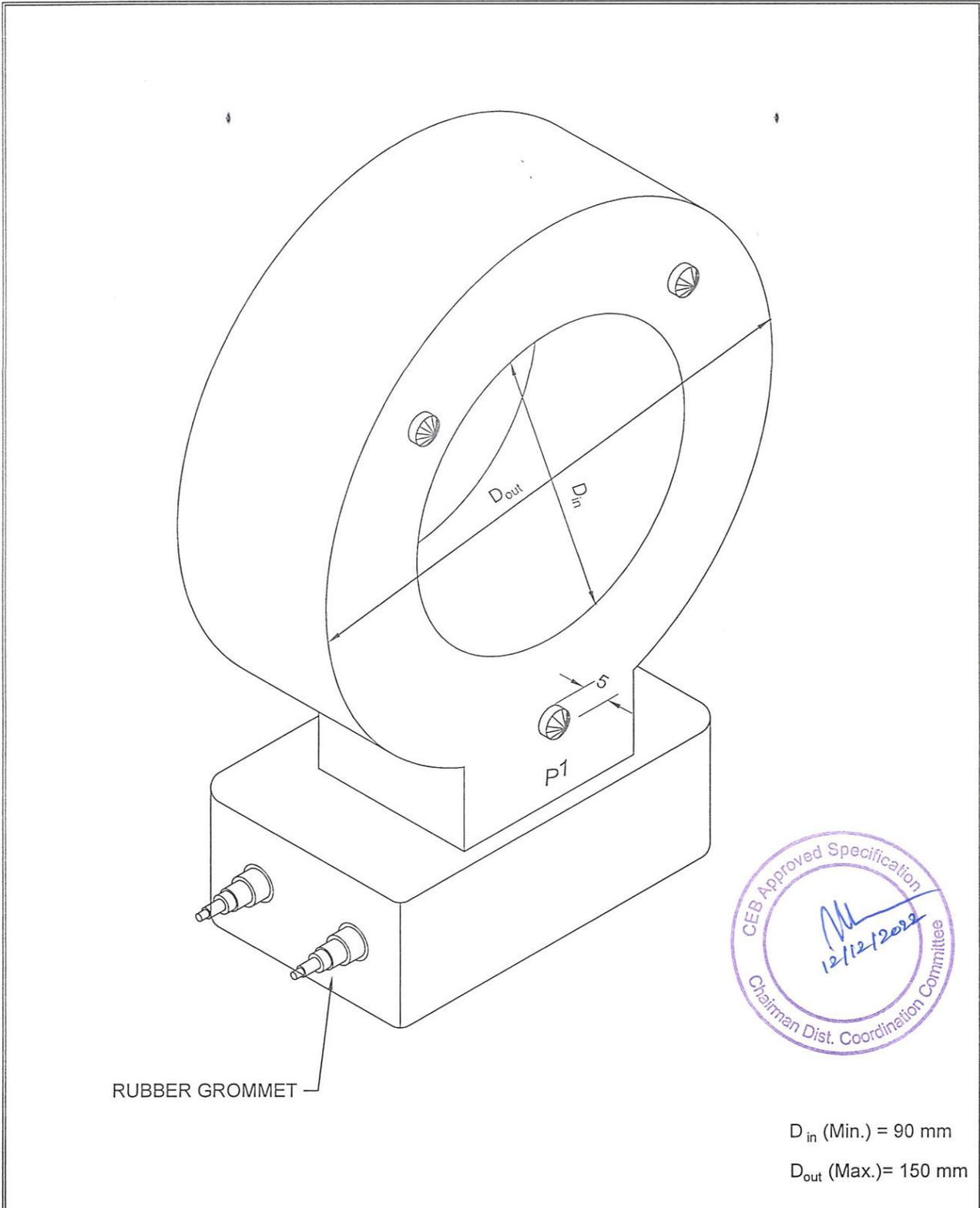
## 12.0 ANNEX

Annex – A: Drawing – Low Voltage outdoor, ring type current transformer

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

Annex – C: Non-Compliance Schedule





RUBBER GROMMET

$D_{in}$  (Min.) = 90 mm  
 $D_{out}$  (Max.) = 150 mm

ALL DIMENSIONS ARE IN mm.

 <p>CEYLON ELECTRICITY BOARD</p>	DISTRIBUTION STANDARDS & SPECIFICATION		SCALE : NOT TO SCALE
	LOW VOLTAGE OUT DOOR RING TYPE CURRENT TRANSFORMER		DRAWN : HARSHA
	DESIGNED BY	APPROVED BY	DATE : JAN. 2022
			DRG. NO : DS&S/2017/027
DISTRIBUTION COORDINATION BRANCH	E.E. (DC)	CHAIRMAN, SPECIFICATION COMMITTEE	CAD NO :

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

			Offered CT Ratio:	
	Description		CEB Requirement	Offered
1.	Name of manufacturer			
2.	Country of origin			
3.	Class of Meter & Model No./ Catalogue Ref. No.			
4.	Type		Indoor/Outdoor (as per the price schedule)	
5.	Applicable standards		As per clause 4.0	
6.	Nominal voltage	V	400	
7.	System highest voltage	V	440	
8.	Frequency	Hz	50	
9.	Primary current	A	As per the price schedule	
10.	Secondary current	A	5	
11.	Accuracy class		As per the price schedule	
12.	Rated burden	VA	10 for outdoor 5 for indoor	
13.	Insulation			
	(a) Type		As specified	
	(b) Class (min.)		Y	
	(c) Whether UV treated or not?	Yes/No	Yes (for outdoor type)	
14.	Terminal box			
	(a) Material			
	(b) Weather resistance capability?	Yes/No	Yes (for outdoor type)	
	(c) Water proof?	Yes/No	Yes (for outdoor type)	
	(d) Whether sealable terminal cover provided?	Yes/No	Yes	
15.	Internal diameter of the current transformers	mm	As specified	
16.	External diameter of the current transformers	mm		
17.	Instrument Security Factor		5	
18.	Limits of the current errors at;			
	(a) 1% of the rated current	%	As per IEC 61869-2	
	(b) 5% of the rated current	%		
	(c) 20% of the rated current	%		
	(d) 100% of the rated current	%		
	(e) 120% of the rated current	%		
19.	Limits of phase displacement at;			
	(a) 1% of the rated current	Minutes	As per IEC 61869-2	
	(b) 5% of the rated current	Minutes		
	(c) 20% of the rated current	Minutes		
	(d) 100% of the rated current	Minutes		
	(e) 120% of the rated current	Minutes		
20.	Power frequency withstand voltage	kV/min	3/1	
21.	Short-time withstand current/Duration	kA/sec	25/1	



22.	Maximum recommended operating temperature	°C		
23.	Whether marking of current transformers in accordance with clause 10.2	Yes/No	Yes	
24.	Whether the requested Type Test certificate as per IEC 61869-2 provided in accordance with clause 6.3?	Yes/No	Yes	
25.	Whether the B.H <sub>1</sub> curves furnished?	Yes/No	Yes	
26.	Whether the ISO 9001: 2015 or latest certification furnished as per clause 6.1?	Yes/No	Yes	
27.	Whether evidence for manufacturing experience as per clause 6.2 provided?	Yes/No	Yes	
28.	Whether information as per clause 7.0 is provided with the offer?	Yes/No	Yes	

.....  
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



### 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

