

Saudi Electricity Company



الشركة السعودية للكهرباء

SEC DISTRIBUTION MATERIALS SPECIFICATION

50-SDMS-01

DATE: 17-05-2004G

50-SDMS-01

SPECIFICATIONS

FOR

**CURRENT TRANSFORMERS
UP TO 36 KV**

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C O N T E N T S

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**1.0 SCOPE**

This specification describes the minimum technical requirements for design, material, manufacturing, testing and performance of current transformers upto 36 kV for indoor or outdoor installation in an enclosure and intended to be used for metering and protection in the distribution system of Saudi Electricity Company (SEC).

2.0 CROSS REFERENCE

This specification shall be read in conjunction with SEC specification No. 01-SDMS-01 (latest revision) titled "General Requirements for all Equipments/ Materials", which shall be considered as an integral part of this specification.

This specification shall also be read in conjunction with SEC purchase order as applicable.

3.0 APPLICABLE CODES & STANDARDS

The latest revision of the following codes and standards shall be applicable to the equipment/material covered by this specification. In case of any deviation, the manufacturer/vendor may propose equipment/material conforming to alternate codes or standards. However, the provision of SEC standards shall supersede the provisions of these standards in case of any conflict.

3.1 IEC-60044-1, Part I Current Transformers.

3.2 ANSI/IEEE C57.13 Requirements for Instrument Transformers.

3.3 ANSI/IEEE C37.110 Guide for the Application of Current Transformers used for protective relaying purposes.

4.0 SERVICE CONDITIONS

Current transformers shall be suitable for operation under the service conditions as per the latest revision of SEC General Specification: 01-SDMS-01.

External surface of the current transformers shall withstand the effects of direct solar radiation. The temperature of surfaces exposed to direct solar radiation shall be regarded as 75 ° C, plus the effect of any internal heating.

5.0 SYSTEM PARAMETERS

Current transformers shall be suitable for operation in SEC distribution system with parameters outlined in the latest revision of SEC General Specification: 01-SDMS-01.



6.0 DESIGN & CONSTRUCTION REQUIREMENTS

6.1 General

Current transformers shall be made from high quality materials. The encapsulating material shall be self extinguishing and heat resistant with excellent mechanical strength.

Low voltage current transformers shall be of single ratio, medium voltage current transformers can be either single or double ratio.

Current transformer shall be provided with mounting accessories for cables and bus bars. These accessories shall be galvanized/stainless steel. Mounting arrangement on wall/floor shall be excluded. Double secondary terminals shall be provided for short circuiting the secondary winding before opening the measuring circuit.

6.2 Rated insulation levels for primary windings

The rated insulation of primary winding of current transformers shall be based on its highest operating voltage for the equipment and shall be determined by the rated power frequency withstand voltages and rated lightning impulse withstand voltage. Rated power frequency withstand voltage and rated impulse withstand voltage shall not be less than the values in Table-1.

Table-1
Rated insulation levels for current transformer primary windings

Highest Voltage for Equipment U_m (rms) (KV)	Rated Power Frequency Withstand Voltage (rms) (KV)	Rated Lightning Impulse Withstand Voltage (Peak) (KV)
0.72	3	6
17.5	38	95
36	70	170

6.3 Insulation requirement for secondary winding

The rated power frequency withstand voltage (insulation level) for secondary winding shall be 3 kV (rms).

6.4 Burden

The minimum burden shall be 10 VA at PF of 0.8 lagging for LV current transformers, and for MV current transformers, it shall be 15 VA both for protection and metering.



The actual value of burden shall be decided based on calculations carried out by manufacture/supplier of the various burdens to be connected to the CTs.

6.5 **Accuracy Class**

The accuracy class for metering CTs shall be 0.5 for the rated burden at the rated current and extended current. The accuracy class for protective current transformers shall be 5P10 and 10P10.

6.6 **Extended Current Ratings**

The minimum requirement for the extended rating at 55 ° C shall be 120% of primary current. The extended rating at 55 ° C shall be clearly marked on the nameplate.

6.7 **Instrument Security Factor (FS)**

Instrument Security Factor (FS) shall be less than five (5).

6.8 **Rated Short Time Thermal Current (I_{th})**

The rated short time thermal current (I_{th}) shall be assigned by the manufacturer for each transformer such that it shall not be less than sixty (60) times the primary current for one second.

6.9 **Rated Dynamic Current (I_{dyn})**

The rated dynamic current (I_{dyn}) shall not be less than 2.5 times I_{th} .

6.10 **LV Current Transformers**

6.10.1 **Current Ratios**

The ratios shall be from the following range:
200/5 Amps, 300/5 Amps, 400/5 Amps, 500/5 Amps, 600/5 Amps, 800/5 Amps, 1500/5 Amps, 3000/5 Amps and 4000/5 Amps.

6.10.2 Current transformers shall be window type, suitable for horizontal and vertical mounting on cables and/or busbars.

6.10.3 Current transformers with primary current up to 400 Amps shall be suitable for cable mounting with screws for rigidly fixing on the surface of fiberglass meter boxes and be provided with removable terminal covers with sealing provisions.



6.10.4 Current transformers with primary current of 500 Amps and above shall be suitable for bus bar fixing.

6.10.5 The window size of LV current transformers shall be suitable for the sizes of cables and busbars as per Table-2.

Table-2
Dimensions of CTs and bus bar/cable sizes

Current Transformer	Busbar	Cable	Maximum Dimension		
			Height	Width	Depth
200/5 Amps		1x30 mm	110 mm	80 mm	55 mm
300/5 Amps		1x30 mm	110 mm	80 mm	55 mm
400/5 Amps		1x30 mm	110 mm	80 mm	55 mm
500/5 Amps	1x10x100 mm		110 mm	80 mm	55 mm
600/5 Amps	1x10x100 mm				
800/5 Amps	1x10x100 mm				
1500/5 Amps	1x10x100 mm				
3000/5 Amps	2x10x100 mm				
4000/5 Amps	3x10x100 mm				

6.10.6 The secondary terminals shall be suitable for 2.5 Sq.mm to 6 Sq.mm. copper cable.

6.10.7 **Split Cores CTs**

Split core CTs shall be encapsulated and integrated by mounting brackets suitable for cable and bus bar fixings. The dimensions in Table-2 shall be applicable for busbars. For cable fixing the dimensions shall be 85x85mm for 1500/5 A and 135x135mm for 3000/5A CTs.

6.11 **MV Current Transformers**

MV current transformers shall be block type cast resin insulated transformers with two secondary cores, one for measurement and the other for protection., or single core for metering only for pole mounted metering units as specified in data schedule.

Each MV CT shall have dual primary ratios as per Table-3 with high and low ratios selectable on primary side.



6.11.1 Current Ratios

The current ratios shall be as given in Table-3.

Table-3
Current Ratios

Voltage	Ratios
17.5 kV	600-300 / 5-5
	400-200 / 5-5
	300-150 / 5-5
	150-75 / 5-5
36 kV	400-200 / 5-5
	200-100 / 5-5
	80-60 / 5-5
	60-30 / 5-5
	20-10 / 5-5

7.0 MARKING

- 7.1 The terminals shall be marked clearly and indelibly either on their surface or in their immediate vicinity. They shall be marked as P1/P2 and S1/S2 for primary and secondary respectively.
- 7.2 The nameplate shall carry the following information in accordance with IEC-60044-1.
- 7.2.1 Manufacturer's name and reference number.
- 7.2.2 Serial number and a type designation.
- 7.2.3 Rated primary and secondary currents.
- 7.2.4 Rated frequency.
- 7.2.5 Rated output and corresponding accuracy class.
- 7.2.6 Current Transformers having an extended current rating shall have this rating at 55 ° C indicated immediately following the class designation, for example, 10 VA class 0.5 ext. 200% 55 ° C.
- 7.2.7 Highest system voltage.
- 7.2.8 Rated insulation level (as per IEC-60044-1).
- 7.2.9 Transformer with two secondary windings, the use of each winding and its corresponding terminals.
- 7.2.10 SEC item number.
- 7.2.11 SEC purchase order number.
- 7.2.12 Year of manufacture



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- 7.3 In addition to all the requirements for the marking of metering current transformers in IEC-60044-1, the transformer ratio shall be boldly marked on the body, in figures at least 20 mm high.

8.0 TESTING

- 8.1 Certified copies of type tests carried out in an independent SEC approved laboratory in accordance with IEC-60044-1, shall be submitted with the tender/inquiry.

- 8.2 Routine test certificates for each current transformer by serial number shall be submitted to SEC prior to the delivery.

8.3 Sample Testing

In case SEC likes to test the current transformers in their own laboratory, the testing shall be carried out according to IEC-60044-1 and shall be done by selecting random sample, as 10% of any batch delivered to the SEC stores. The batch shall be assumed as rejected if more than three (3) current transformers found faulty in the sample.

In case of acceptance, SEC can decide to test the whole batch and the supplier has to replace the failed current transformers or any other defective current transformer in the same batch found later.

In case of rejection, the supplier shall have two choices. The first is to replace the whole batch, the second is to let SEC do the test for the whole quantity, and the supplier shall bear the cost of the test and replace the failed current transformers.

9.0 PACKING & SHIPPING

- 9.1 The current transformers shall be individually packed in a non-returnable containers. These containers shall be capable of protecting the current transformers from the rigours of transportation by sea or by land transport.

- 9.2 Each box of individual current transformer shall be marked with the information as mentioned in clause 7.2.

10.0 GUARANTEE

- 10.1 The vendor shall guarantee the current transformers against all defects arising out of faulty design or workmanship, or defective materials for a period of one (1) year from the date of commissioning, or two (2) years from the date of delivery. SEC certificates for the date of commissioning shall be accepted.



10.2 If no exceptions to this specification are taken and no list of deviations is submitted, it shall be deemed that, in every respect, the current transformers offered shall conform to this specification. SEC interpretation of this specification shall be accepted.

11.0 TECHNICAL DATA & DRAWINGS

Drawing showing the following shall be submitted:

- a) Layout and dimensions of terminals.
- b) Cable/Busbar mounting details of current transformers.
- c) Dimensions of window aperture.
- d) Dimensions of transformers.
- e) Weight of transformers.

12.0 TECHNICAL DATA SCHEDULE

The attached Technical Data Schedule shall be completed and submitted with the bid along with type tests and supporting catalogues.



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TECHNICAL DATA SCHEDULE
(CURRENT TRANSFORMERS UP TO 36 KV)
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SEC Enquiry No. _____

Item No. _____

SEC Ref.	Description	Unit	SEC Specified Values	Vendor Proposed Values
6.0	Design and Construction Requirements			
	Rated Voltage			
6.2	Rated Insulation Level of primary winding			
	▪ Impulse Withstand Voltage Peak	KV		
	▪ Power Frequency Withstand Voltage	KV		
6.3	Rated Insulation level of secondary winding	KV		
6.4	Burden at 0.8 Lagging PF	VA		
6.5	Accuracy Class		0.5 (metering)	
6.6	Extended Current Rating at 55 ° C	%	120	
6.7	Instrument Security Factor	FS	< 5	
6.8	Rated Short Time Thermal Current (I_{th})			
6.9	Rated Dynamic Current (I_{dyn})			
6.10.1	Current Ratio		As per enquiry	
6.10.2	Transformer Type (Window type/Block type/Split Core)			
6.10.5	Window Size			
7	Markings:			
7.1	Terminals			
	Markings of Primary Terminals		P1 – P2	
	Marking of Secondary Terminals		S1 – S2	
	Provision of Double Secondary Terminals		Yes	
	Secondary Terminal Cable Size	mm ²	2.5 - 6	
	Mounting Accessories			
	Current Transformer Dimensions			
	Creepage Distance for MV Current Transformers			



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SEC Enquiry No: _____

Item No: _____

- A) Additional technical information or features specified by SEC.
- B) Additional supplementary data or features proposed by Vendor/Supplier.
- C) Other particulars to be filled up by Vendor/Supplier.
 (Use separate sheet if needed).

Address	Manufacturer	Vendor/Supplier
Name of the Company		
Location & Office Address		
Authorized Name & Signature		
Date		
Official Seal / Stamp		