



उत्पाद मैनुअल

**आई एस 16227 (PART 2): 2016/ आई ई सी 61869 (PART 2): 2012 के अनुसार
इंस्ट्रूमेंट ट्रांसफॉर्मर भाग 2 करंट ट्रांसफॉर्मरो के लिए अतिरिक्त आवश्यकताएं के लिए**

दस्तावेज संख्या – पी एम/आई एस 16227 (Part 2)/ 1/जनवरी 2021

भारतीय मानक ब्यूरो की स्कीम-I (अनुरूपता मूल्यांकन) विनियम, 2018 के तहत यह उत्पाद मैनुअल प्रमाणीकरण के प्रचालन में रीति और पारिश्रिता की सुसंगतता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसी द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस प्रमाणीकरण लाइसेंस/प्रमाणपत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज का उपयोग किया जा सकता है।

PRODUCT MANUAL FOR

**Instrument Transformers - Additional Requirements for Current Transformer
ACCORDING to IS 16227 (PART 2): 2016/IEC 61869 (PART 2): 2012**

Document No.- PM/ IS 16227 (Part 2)/ 1/Jan 2021

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

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**PRODUCT MANUAL FOR
INSTRUMENT TRANSFORMERS - ADDITIONAL
REQUIREMENTS FOR CURRENT TRANSFORMERS
ACCORDING TO IS 16227 (PART 2): 2016/IEC 61869 (PART 2): 2012**

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1.	Product	:	IS 16227 (Part 2): 2016/ IEC 61869 (Part 2): 2012
	Title	:	Instrument Transformers - Additional Requirements for Current Transformer
	No. of Amendments	:	Nil
2.	Sampling Guidelines:		
a)	Raw material	:	--
b)	Grouping guidelines	:	Please refer ANNEX - A
c)	Sample Size	:	1 No.
3.	List of Test Equipment	:	Please refer ANNEX – B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	Possible tests in a day :	:	All Routine Tests
6.	Scope of the Licence	:	Please refer ANNEX – D

ANNEX A

Grouping Guidelines

1. Samples of each variety of Current Transformers shall be tested considering the following:
 - i. Type of Current Transformer
 - ii. Current Transformer Ratio
 - iii. Rated Output or Rated Burden
 - iv. Accuracy Class
 - v. Type of Insulation
 - vi. Class of Insulation
 - vii. Insulation Level
 - viii. Highest Voltage for Equipment
 - ix. Rated Continuous Thermal Current
 - x. Rated Short Term Thermal Current
 - xi. Instrument Security Factor
 - xii. Degree of Protection
 - xiii. Application (Indoor/Outdoor)
2. All other parameters remaining the same, the following relaxation may be given when a variety is tested for all the requirements:
 - (a) To cover a range of current transformers ratio for same secondary current, samples of minimum primary current and maximum primary current may be tested.
3. The Firm shall declare the varieties they intend to cover in the Licence. The Scope of Licence may be restricted based on the manufacturing and testing capabilities of the manufacturer.
4. During the operation of the Licence, BO shall ensure that all the varieties covered in the Licence are tested in rotation, to the extent possible.

ANNEX B**List of Test Equipment***Major test equipment required to test as per the Indian Standard*

Sl. No.	Tests used in with Clause Reference	Test Equipment
1.	Power-frequency voltage withstand tests (Clause 7.3.1, Clause 7.3.3 & Clause 7.3.4)	a) Power-frequency voltage source b) Voltage measurement system
2.	Partial discharge measurement (Clause 7.3.2)	a) Transformer b) Coupling Capacitor c) Partial Discharge Instrument d) Filter e) Impedance Measuring Instrument
3.	Tests for accuracy (Clause 7.3.5 & 7.2.6)	a) Instrument Current Transformer Test Set b) Standard CT with Current Source c) CT Comparator
4.	Enclosure tightness test at ambient temperature (Clause 7.3.7 & Clause 7.2.8), Pressure Test for the Enclosure (Clause 7.3.8 & Clause 7.2.9)	a) Thermometer b) Pressure Source c) Pressure Gauge
5.	Determination of the secondary winding resistance (Clause 7.3.201)	a) Resistance meter b) Temperature sensor
6.	Determination of the secondary loop time constant (Clause 7.3.202), Test for rated knee point e.m.f. and exciting current at rated knee point e.m.f (Clause 7.3.203), Inter-turn overvoltage test (Clause 7.3.204) & Determination of the instrument security factor (FS) of measuring current transformers (Clause 7.5.2)	a) Voltage source b) RMS voltage measuring instrument c) RMS current measuring instrument d) Peak reading current measuring instrument e) Resistance meter
7.	Temperature-rise test (Clause 7.2.2)	a) Voltage source b) Current measuring system c) Temperature Indicator d) Micro ohmmeter
8.	Impulse voltage withstand test on primary terminals (Clause 7.2.3)	a) Impulse voltage source b) Voltage measurement system
9.	Wet test for outdoor type transformers (Clause 7.2.4)	a) Water Sprayer Apparatus b) Thermometer c) Water Resistivity Meter d) Power-frequency voltage source e) Voltage measurement system

10.	Electromagnetic Compatibility tests (Clause 7.2.5)	Radio Interference Voltage Meter
11.	Verification of the degree of protection by enclosures (Clause 7.2.7)	Protection against access to hazardous parts and protection against ingress of solid foreign objects Test apparatus
12.	Short-time current tests (Clause 7.2.201)	a) Short circuit current generating system b) Measurement control system
13.	Determination of the remanence factor (Clause 7.5.1)	a) Voltage source b) Voltage waveform measuring instrument c) Current waveform measuring instrument

Special Tests (As agreed to between manufacturer and purchaser)

1.	Chopped impulse test on primary terminals (Clause 7.4.1) & Multiple chopped impulse test on primary terminals (Clause 7.4.2)	a) Impulse voltage source b) Voltage measurement System
2.	Measurement of capacitance and dielectric dissipation factor (Clause 7.4.3)	a) Power-frequency voltage source b) Voltage measurement system c) Capacitance and dielectric dissipation factor measuring instrument d) Coupling capacitor
3.	Transmitted overvoltage test (Clause 7.4.4)	a) Test Generator b) Cathode Ray Oscilloscope b) 50Ω Co axial Cable d) Voltage Source b) Voltage measurement system
4.	Mechanical tests (Clause 7.4.5)	a) Load Measurement Device b) Deflection Indicator
5.	Internal arc fault test (Clause 7.4.6)	a) Short circuit current generating system b) Measurement control system
6.	Enclosure tightness test at low and high temperatures (Clause 7.4.7)	a) Environmental Chamber b) Thermometer c) Pressure Pump d) Pressure Gauge
7.	Gas dew point test (Clause 7.4.8)	a) Gas Dew Point Tester b) Hygrometer
8.	Corrosion test (Clause 7.4.9)	Humidity and Temperature Chamber
9.	Fire hazard test (Clause 7.4.10)	a) Glow Wire Test Apparatus b) Flame Test Apparatus

The above list is indicative only and may not be treated as exhaustive.

ANNEX C

Scheme of Inspection And Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – As per the requirement of IS 16227 (Part 2): 2016.

4. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

4.1 All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

5. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
7.3	Routine Tests						
7.3.1	Power-frequency voltage withstand tests on primary terminals	7.3.1	IS 16227 (Part 2)	R	Each CT	--	--
7.3.2	Partial discharge measurement	7.3.2	IS 16227 (Part 1)	R	Each CT	--	--
7.3.3	Power-frequency voltage withstand tests between sections	7.3.3	IS 16227 (Part 1)	R	Each CT	--	--
7.3.4	Power-frequency voltage withstand tests on secondary terminals	7.3.4	IS 16227 (Part 1)	R	Each CT	--	--
7.3.5	Tests for accuracy	7.3.5	IS 16227 (Part 2)	R	Each CT	--	--
7.3.6	Verification of markings	7.3.6	IS 16227 (Part 1)	R	Each CT	--	--
7.3.7	Enclosure tightness test at ambient temperature	7.3.7	IS 16227 (Part 1)	R	Each CT	--	--
7.3.8	Pressure test for the enclosure	7.3.8	IS 16227 (Part 1)	R	Each CT	--	--
7.3.201	Determination of the secondary winding resistance	7.3.201	IS 16227 (Part 2)	R	Each CT	--	--
7.3.202	Determination of the secondary loop time constant	7.3.202	IS 16227 (Part 2)	R	Each CT	--	--
7.3.203	Test for rated knee point e.m.f. and exciting current at rated knee point e.m.f	7.3.203	IS 16227 (Part 2)	R	Each CT	--	--
7.3.204	Inter-turn overvoltage test	7.3.204	IS 16227 (Part 2)	R	Each CT	--	--

7.2	Type Tests						
7.2.2	Temperature-rise test	7.2.2	IS 16227 (Part 2)	S	4 CTs	Once in 6 months	Please see Note 1
7.2.3	Impulse voltage withstand test on primary terminals	7.2.3	IS 16227 (Part 2)	S	4 CTs	Once in 5 years	
7.2.4	Wet test for outdoor type transformers	7.2.4	IS 16227 (Part 1)	S	4 CTs	Once in 6 months	
7.2.5	Electromagnetic Compatibility tests	7.2.5	IS 16227 (Part 1)	S	4 CTs	Once in 5 years	
7.2.6	Tests for accuracy	7.2.6	IS 16227 (Part 2)	S	4 CTs	Once in 3 months	
7.2.7	Verification of the degree of protection by enclosures	7.2.7	IS 16227 (Part 1)	S	4 CTs	Once in 5 years	
7.2.8	Enclosure tightness test at ambient temperature	7.2.8	IS 16227 (Part 1)	S	4 CTs	Once in 6 months	
7.2.9	Pressure test for the enclosure	7.2.9	IS 16227 (Part 1)	S	4 CTs	Once in 6 months	
7.2.201	Short-time current tests	7.2.201	IS 16227 (Part 2)	S	4 CTs	Once in 5 years	
7.4	Special Tests						
7.4.1	Chopped impulse test on primary terminals	7.4.1	IS 16227 (Part 1)	S	As agreed on by manufacturer and purchaser		
7.4.2	Multiple chopped impulse test on primary terminals	7.4.2	IS 16227 (Part 1)	S			
7.4.3	Measurement of capacitance and dielectric dissipation factor	7.4.3	IS 16227 (Part 2)	S			
7.4.4	Transmitted overvoltage test	7.4.4	IS 16227 (Part 1)	S			
7.4.5	Mechanical tests	7.4.5	IS 16227 (Part 1)	S			
7.4.6	Internal arc fault test	7.4.6	IS 16227 (Part 2)	S			
7.4.7	Enclosure tightness test at low and high temperatures	7.4.7	IS 16227 (Part 1)	S			
7.4.8	Gas dew point test	7.4.8	IS 16227 (Part 1)	S			
7.4.9	Corrosion test	7.4.9	IS 16227 (Part 1)	S			
7.4.10	Fire hazard test	7.4.10	IS 16227 (Part 1)	S			

7.5	Sample Tests					
7.5.1	Determination of the remanence factor	7.5.1	IS 16227 (Part 2)	S	The manufacturer should define, execute and document the sample test program according to the production quantities. Please refer Annex D of IS 16227 (Part 1)	
7.5.2	Determination of the instrument security factor (FS) of measuring current transformers	7.5.2	IS 16227 (Part 2)	S		

Note-1: In case of failure of any Current Transformer in type test, marking of Current Transformers shall be stopped immediately. Further marking shall continue on obtaining satisfactory result on 5 consecutive Current Transformers with improvements and of same type and design.

Note-2: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-3: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

ANNEX D**Scope of Licence**

	“Licence is granted to use Standard Mark as per IS 16227 (Part 2): 2016 with the following scope:	
	Name of the product	Current Transformers
	Type	
	Current Transformer Ratio	
	Rated Output or Rated Burden	
	Accuracy Class	
	Type of Insulation	
	Class of Insulation	
	Insulation Level	
	Line Voltage and Rated Frequency	
	Highest Voltage for Equipment	
	Rated Continuous Thermal Current	
	Rated Short Term Thermal Current	
	Instrument Security Factor	
	Degree of Protection	
	Application	Indoor/Outdoor