

**भारतीय मानक ब्यूरो**  
**(केंद्रीय मुहर विभाग III)**

हमारा संदर्भ : सी एम डी- III/16 : आई एस 13779

23 03 2021

विषय : आई एस 13779 के अनुपालन हेतु गाइडलाइन ।

सभी शाखा कार्यालय से आग्रह है कि गाइडलाइन का अनुपालन तत्काल प्रभाव से सुनिश्चित करें।

औरोस्मिता कबिराज  
वैज्ञानिक सी (सी एम डी- III)

प्रमुख (सी एम डी- III)

सभी क्षेत्रीय/शाखा कार्यालय  
आई टी एस विभाग – बीआईएस इंटरनेट पर डालने हेतु

**BUREAU OF INDIAN STANDARDS**  
**(Central Marks Department-III)**

Our Ref: CMD-III/16 : IS 13779

23 03 2021

**Subject: Guidelines for implementation of Revised IS 13779: 2020 “ac STATIC WATTHOUR METERS CLASS 1 AND 2-Specification”**

This has reference to the subject mentioned above.

BOs may kindly ensure implementation of the guidelines with immediate effect.

**Aurosmita Kabiraj**  
**Sc-C (CMD-III)**

**Head (CMD-III)**

**Circulated to: All ROs/BOs**

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**CENTRAL MARKS DEPARTMENT III**

**Subject: Guidelines for implementation of Revised IS 13779: 2020 “ac STATIC WATTHOUR METERS CLASS 1 AND 2-Specification”**

1. IS 13779: 1999 has been revised as IS 13779: 2020 and has been published. The last date for implementation of the revised Standard is 13 Dec 2021 after which the old Standard shall stand withdrawn.
2. All BOs shall inform the Applicants and Licensees under their jurisdiction about implementation of the revised Standard **within a week of issuance of these guidelines.**
3. The significant changes in the revised Standard as listed below for the purpose of general guidance. BOs shall ensure that the product conforms to all the requirements, as applicable, as per the revised Standard.
  - i. Table 3 Typical Rated Maximum Current: NOTE added for current transformer operated meters
  - ii. Modification in Table 1- Standard reference voltages
  - iii. Cl 6.1 Note- requirements for outdoor meters removed
  - iv. Cl 6.11 Output Device- Additional high resolution register with minimum decimal of two digits shall also be available in the meter for testing purpose as mentioned in this standard
  - v. Modification in Table 6- Standard current markings
  - vi. Table 7 Temperature Range - Limit range of operation removed, limit range of storage and transport modified
  - vii. Cl 9.1.2 Power Consumption in Current Circuit- Note added
  - viii. Cl 9.2.2 Voltage Dips and Interruptions – Requirement that after this test, the data from the memory should not be lost has been removed
  - ix. Cl 9.2.3 Short Time Over Current- Tolerance added for Short-time over current
  - x. Cl 9.4 Influence of Heating – Requirements added
  - xi. Cl 10.1 Immunity to Electromagnetic Disturbance- Surge immunity test added
  - xii. Cl 11.3 Limits of Error Due to Ambient Temperature Variation – Test modified
  - xiii. Cl 12.2 Classification of Tests – requirements added
  - xiv. Cl 11.7 Repeatability of Error Test - Repeatability of error also to be checked at Ib
  - xv. Cl 12.2.1 Number of Samples and Criteria for Conformity- number of samples changed
  - xvi. Cl 12.3.1 Shock Test – Test method Standard changed
  - xvii. Cl 12.3.2 Vibration Test- Tolerance on Transition frequency added
  - xviii. Cl 12.3.3 Spring Hammer Test- referred standard updated
  - xix. Cl 12.5 Test of Protection Against Penetration of Dust and Water- For protection against penetration of dust, test condition for indoor meters has been removed
  - xx. Cl 12.6.1 Dry Heat Test, 12.6.2 Cold Test and 12.6.3 Damp Heat Cycle Test - Test method Standards changed
  - xxi. Cl 12.6.2 Cold Test - test conditions for outdoor meters removed
  - xxii. Test for protection against solar radiation for outdoor meters removed
  - xxiii. Cl 12.7.4 Test of Influence of Self- Heating- Maximum test duration specified
  - xxiv. Cl 12.7.5 Test of Influence of Heating – test criteria modified wrt voltage

- xxv. CI 12.7.6 Test of Insulation Properties – Test requirements added in 12.7.6.1
- xxvi. CI 12.7.6.2 Impulse voltage test – test method standard modified
- xxvii. Table 21 a. c. Voltage Tests – for meters with double insulation, test between circuits not intended to be connected together in service added
- xxviii. 12.7.6.3 & 12.7.6.4 – routine test requirements added
- xxix. CI 12.9 Test for Electromagnetic Compatibility (EMC) – Test standards and methods modified, Surge immunity test added
- xxx. CI 12.10 Test of Accuracy Requirements- minimum test period modified
- xxxi. 12.13 Test of No-Load Condition – test method modified
- xxxii. CI 12.17 Repeatability of Error Test - test method modified

4. The detailed comparison between the 1999 and 2020 versions are given in Annex 1.
5. Consequent upon the issuance of the revised Standard, existing Product Manual has been revised as Doc: **PM/ IS 13779/ 3/ March 2021**
6. The guidelines for implementation of the revised Standard is given below:

**A. LICENSEES:**

- (i) All Licensees shall implement the revised Standard by 13 Dec 2021. BOs shall ensure that no Licences are under operation as per the old Standard after 13 Dec 2021. **The status of implementation of the revised Standard shall be confirmed by Head (BO) to CMD-III within two weeks of the last date of concurrent running.**
- (ii) Licensees shall submit evidence of conformity to the additional/modified requirements through In-house/Independent Test Reports or Test Certificates, as applicable. Verification of implementation of the revised Standard, wherever required, may be done during the next visit **which may normally be completed within six months of the last date of concurrent running.**
- (iii) If the Licensee fails to complete all actions by 13 Dec 2021 it shall be dealt with as per the prevailing guidelines.

**B. APPLICATIONS FOR GRANT OF LICENCE:**

- (i) Existing Applications where Sample has been submitted in the Laboratory/Test Report has been issued by the Laboratory may be processed as per the old Standard. However, if the Applicant is desirous of considering the Application as per the revised Standard, a declaration may be obtained from the Applicant to that effect and the Application may be processed accordingly. An undertaking shall also be obtained from such Applicants that if the sample fails in new test requirements, Licence will not be granted by BIS as per the old version.
- (ii) Applications which are recorded henceforth may be processed as per the old Standard or the revised Standard. Processing of Applications as per the old Standard shall be permitted only upto 13 Dec 2021 and for such cases Applicant shall give a declaration that they will implement the revised Standard by 13 Dec 2021.

(iii) Beyond 13 Dec 2021 no Licence shall be granted as per the old Standard.

**C. CHANGE IN SCOPE OF LICENCE:**

- (i) For change in scope of licence, the relevant provisions as given above for Applicants shall apply.
- (ii) However, processing of such applications for change in scope of licence as per the old Standard shall be permitted only upto the date of implementation of the revised Standard or upto 13 Dec 2021 whichever is earlier.

7. The above guidelines come into force with immediate effect.

**Aurosmita Kabiraj**  
**Sc C**

Head (CMD III)  
**DDG (Certification)**

	Removed/replaced
	Added/replaced

Clause No.	IS 13779:1999 RE-affirmed 2004	IS 13779:2020
(1)	(2)	(3)
	<b>ac Static Watthour Meters, Class 1 and 2 — Specification ( First Revision )</b>	<b>A.C. Static Watthour Meters, Class 1 and 2 — Specification ( Second Revision )</b>
<b>1 SCOPE</b>	<b>1.2</b> It applies only to static watt-hour meters consisting of measuring element(s) and register(s) enclosed together in the meter case. It also applies to operation indicator(s) and test output(s). It also applies to multi-rate tariff meters and meters which measure energy in both directions and intended for indoor and outdoor application	<b>1.2</b> It applies only to static watt-hour meters consisting of measuring element(s) and register(s) enclosed together in the meter case. It also applies to operation indicator(s) and test output(s). It also applies to multi-rate tariff meters and meters which measure energy in both directions and intended for indoor and outdoor application. <b>For meters with smart functions, refer IS 16444 (Part 1).</b>
<b>3.5.8 Starting Current</b> New clause	-	The lowest value of current at which the meter starts and continues to register.
<b>5.3 Rated Maximum Current Table 3</b>	<b>NOTE</b> — For long range applications rated maximum currents are usually higher multiples of basic currents. For example, 400 percent, for 1-phase direct connected meters, 200 percent, for 3-phase direct connected or CT operated meters and for 1-phase CT operated meters	<b>NOTE</b> — The current transformer operated meters with rated maximum current of 2 times of basic current, cover and are suitable for meters of rated maximum current of 1.2 and 1.5 times of basic current also. For requirements higher than 2 time of basic current should be the subject of purchase contract.
<b>6.1</b>	<b>Note- requirements for outdoor meters removed</b>	-

<b>6.10 Display of Measured Values</b>	<p>The information can be shown either with an electro- mechanical register or an electronic display. In case of an electronic display the corresponding non- volatile memory shall have a minimum retention time of 5years.</p>	<p>The information can be shown either with an electro- mechanical register or an electronic display. In case of an electronic display the corresponding non- volatile memory shall have a minimum retention time of 5years.  <b>Manufacturer shall declare the retention time.</b></p>
<b>6.11 Output Device</b>	<p>The resolution of the test output in the form of pulses or high resolution register, whether accessible on the meter through external display, shall be sufficient to conduct satisfactorily accuracy test at the lowest load in less than 5 min and starting current test in less than 10 min.</p>	<p>The resolution of the test output in the form of pulses or high resolution register, whether accessible on the meter through external display, shall be sufficient to conduct satisfactorily accuracy test at the lowest load in less than 5 min and starting current test in less than 10 min. <b>Additional high resolution register with minimum decimal of two digits shall also be available in the meter for testing purpose as mentioned in this standard.</b></p>
<b>9.1.1 Power Consumption in Voltage Circuit</b>	<p>NOTES:  2 In case additional features like remote metering, <b>prepayment metering</b> etc. is built into the meter then additional loss may be agreed between supplier and purchaser.</p>	<p>NOTES:  2 In case additional features like remote metering etc. is built into the meter then additional loss may be agreed between supplier and purchaser.</p>
<b>9.1.2 Power Consumption in Current Circuit</b>	<p>-</p>	<p>NOTE — The apparent power consumption in current circuit shall not be applicable for meters where load current carrying conductors are not terminated at the meter and are guided through current measuring sensors.</p>
<b>9.2.2 Voltage Dips and Interruptions</b>	<p><b>Further,after this test the data from the memory should not be lost.</b></p>	<p>This requirement has been removed</p>
<b>9.2.3 Short Time Over Current</b>	<p>a) Meter for directconnection  The meter shall be able to carry a short time over current of 30 I<sub>max</sub> for one half-cycle at rated frequency.  b)Meter for connection through currenttrans- former</p>	<p>a) Meter for direct connection.  The meter shall be able to carry a short time over current of 30 I<sub>max</sub> <b>with tolerance of -10 percent and + 0 percent</b>, for one half-cycle at rated frequency.  b) Meter for connection through current</p>

	The meter shall be able to carry for 0.5 s a current to 20 times the maximum current.	transformer. The meter shall be able to carry for 0.5 second a current equal to 20 times the maximum current with tolerance of +0 to -10 percent.
<b>9.4 Influence of Heating</b>	For testing, <i>see</i> 12.7.5.	For testing, <i>see</i> 12.7.5. Visual inspection for deformation, if any of the meter including terminal blocks is to be carried out. There shall be no deformation. Connecting cables during the test shall be of ratings not less than the test current.
<b>10.1 Immunity to Electromagnetic Disturbance</b>	The meter shall be designed in such a way that conducted or radiated electromagnetic disturbance as well as electrostatic discharge do not damage nor substantially influence meter. NOTE — The disturbances to be considered are: a) Electrostatic discharge; b) Electromagnetic HF field; c) Fast transient burst	The meter shall be designed in such a way that conducted or radiated electromagnetic disturbance as well as electrostatic discharge do not damage nor substantially influence meter. NOTE — The disturbances to be considered are: a) Electrostatic discharge; b) Electromagnetic HF field; c) Fast transient burst; d) Surge immunity test.
<b>11.2 Limits of Error due to Other Influence Quantities</b>	LimitsofErrorDuettoOtherInfluence Quantities (Voltage-Variation, Frequency Variation, Phase Sequence, Wave-form, Voltage-Unbalance)	11.2 Limits of Error due to Other Influence Quantities
<b>11.3 Limits of Error Due to Ambient Temperature Variation</b>	The mean temperature coefficient shall not exceed the limits given in Table 18. The determination of the mean temperature coefficient for a given temperature shall be made over a 30°C temperature range 15°C above and 15°C below that temperature, the temperature shall not exceed the specified operating temperature range	The determination of the mean temperature coefficient for operating temperature range shall be made, but in no case, the temperature shall exceed the specified operating temperature range. The whole operating temperature range shall be divided into two subranges: a) lowest value of the operating temperature range to reference temperature and; and b) reference temperature to maximum value of operating temperature range. The mean temperature coefficients of each subrange shall be determined individually by

		<p>taking measurements at lowest value of operating temperature range, reference temperature and maximum value of operating temperature range.</p> <p>Each of the mean temperature coefficient shall not exceed the limits given in Table 18.</p> <p style="text-align: center;">↑</p> <p>Test has been modified.</p>
<b>11.7 Repeatability of Error Test</b>	<p>Repeatability of error at 5% <math>I_b</math> and UPF load shall not exceed 0.5 for class 1 and 1.0 for class 2 as measured by the dispersion method (see 12.17).</p>	<p>Repeatability of error shall be checked at 0.05 <math>I_b</math>, <math>I_b</math> and UPF load. Repeatability shall not exceed 0.5 percent for class 1 and 1.0 percent for class 2 as measured by dispersion method. (see 12.17).</p>
<b>12.2 Classification of Tests</b>	<p>The schedule and recommended sequence shall be as given in Table 20</p>	<p>The schedule and recommended sequence shall be as given in Table 20. The accuracy of meter at reference conditions shall remain within accuracy class after completion of any type test, irrespective of the variation allowed during particular type test.</p>
<b>12.2.1 Number of Samples and Criteria for Conformity</b>	<p>Type tests shall be applied to three test specimens; in the event of one specimen failing to comply in any respect, further three specimens shall be taken all of which shall comply with the requirements of the standard.</p>	<p>Type test shall be made on minimum one or more samples (1st set) selected by the manufacturer and test sequence shall be as given in Table 20. Each specimen shall comply with all tests given in Table 20. In case of one test sample failing to comply in any respect, further same number(s) of sample(s) (equivalent to 1st set) shall be taken all of which shall comply with the requirements of standard given in Table 20.</p>
<b>12.3.1 Shock Test</b>	<p>The test shall be carried out as per IS 9000 (Part 7/ Sec 1 to 5) under the following conditions:</p> <p>After the test, the meter shall show no damage or change of information. After the test, variation</p>	<p>The test shall be carried out as per IS 9000 (Part 7/Sec 1) under the following conditions:</p> <p>After the test, the meter shall show no damage or change in cumulative kWh register. After the test, variation in percentage error shall not exceed the 50</p>



	in percentage error shall not exceed the 50 percent of accuracy class index at $I_b$ , $0.05I_b$ and $I_{max}$ (at $\text{Cos}\theta = 1$ ).	percent of accuracy class index at $I_b$ , $0.05I_b$ and $I_{max}$ (at $\text{Cos}\theta = 1$ ).
<b>12.3.2</b> <i>Vibration Test</i>	c) Transition frequency ( $f$ ): 60 Hz	c) Transition frequency ( $f$ ): 60 $\pm 3$ Hz.
<b>12.3.3</b> <i>Spring Hammer Test</i>	The mechanical strength of the meter case shall be tested with a spring hammer (IEC 60068-2-75 (1997) Environmental testing—Part 2-75: Tests—Test Eh: Hammtsertest).	The mechanical strength of the meter case shall be tested with a spring hammer (refer IEC 60068-2-75).  This is a <sup>↑</sup> revised reference to 2014 edition of IEC 60068-2-75.
<b>12.5 Test of Protection Against Penetration of Dust and Water</b>	ii) The test should be conducted with sample lengths of cable (exposed and sealed) of the types specified by the manufacturer in place iii) For indoor meters only, the same atmospheric pressure is maintained inside the meter as outside (neither —under nor over pressure). First characteristic digit: 5 (IP 5X).	2) The test should be conducted with sample lengths of cable (exposed and sealed) of the types specified by the manufacturer and terminal cover in place 3) First characteristic digit: 5 (IP 5X).
<b>12.6 Tests for Climatic Influences</b>	After each of the climatic tests, the meter shall show no damage or change of the information. These tests should not affect the functioning of the meters	After each of the climatic tests, the meter shall show no damage or change in cumulative kWh register. These tests should not affect the functioning of the meters.
<b>12.6.1 Dry Heat Test</b>	The test shall be carried out according to relevant section of IS 9000 (Part 3/Sec 1 to 5).	The test shall be carried out according to relevant section of IS 9000 (Part 3/Sec 3).  <sup>↑</sup> Test method reference has been changed.
<b>12.6.2 Cold Test</b>	The test shall be carried out according to relevant section of IS 9000 (Part 2/Sec 1 to 4) under the following conditions: b) Temperature: $-25^\circ\text{C}$ to $\pm 3^\circ\text{C}$ for outdoor meters c) Duration of the test: 16 Hours for outdoor meters.	The test shall be carried out according to relevant section of IS 9000 (Part 2/Sec 3) under the following conditions: b) Temperature : $- 25 \pm 3^\circ\text{C}$ c) Duration of the test : 72 h  <sup>↑</sup> Both Test method reference and conditions

		have been changed.
<b>12.6.3</b> <i>Damp Heat Cycle Test</i>	The test shall be carried out according to relevant section of IS 9000 (Part 5/Sec 1 and 2) under the following conditions:	The test shall be carried out according to relevant section of IS 9000 (Part 5/Sec 2) under the following condition:  Test method reference has been changed.
<b>12.6.3.1</b>	a) An insulation test according to 12.7.6.4. b) A functional check meter shall show no damage or change of information.	a) An insulation resistance test according to 12.7.6.4. b) A functional check. c) The meter shall show no damage or change in cumulative kWh register.
<b>12.6.4</b> <b>Protection against solar radiation</b>	The meter for outdoor use shall withstand solar radiation. The test shall be carried out according to IEC 60068-2-5, under the following conditions: a) For outdoor meters only; b) Meter in non-operating condition; c) Test procedure A (8 h irradiation and 16 h darkness); d) Upper temperature: +55 °C; e) Duration of the test: 3 cycles or 3 days.  After the test the meter shall be visually inspected. Enclosure shall not have any crack/s after this test. The appearance and, in particular, the legibility of markings, display visibility shall not be altered. The dielectric strength (insulating strength) of the meter shall not be impaired — For testing, refer 12.6.7.4	This clause has been removed.
<b>12.7.4</b> <i>Test of Influence of Self-Heating</i>	-	Maximum test duration shall not be more than 2 h.  This requirement has been added.

<p><b>12.7.5</b> <i>Test of Influence of Heating</i></p>	<p>With each current circuit of the meter carrying rated maximum current and with each voltage circuits (and with those auxiliary, voltage circuits which are energised for periods of longer duration than their thermal time constants) carrying <b>1.2</b> times the reference voltage, the temperature rise of the external surface shall not exceed by more than <b>20K</b>, with the ambient temperature between 25°C to 45°C.</p>	<p>With each current circuit of the meter carrying rated maximum current and with each voltage circuits (and with those auxiliary, voltage circuits which are energised for periods of longer duration than their thermal time constants) carrying <b>1.15</b> times the reference voltage, the temperature rise of the external surface shall not exceed by more than <b>20°C</b>, with the ambient temperature between 25°C to 45°C.</p>
<p><b>12.7.6.1</b> <i>General test conditions</i></p>	<p>A flashover (capacitance discharge) is not necessarily a criterion of failure as this may occurs in a position that does not damage and the manufacturer shall decide, whether or not to eliminate the cause. provided other criteria of acceptance are met.</p>	<p>A flashover (capacitance discharge) during impulse test is not necessarily a criterion of failure as this may occurs in a position that does not damage and the manufacturer shall decide, whether or not to eliminate the cause. <b>The meter shall withstand a.c. voltage as per 12.7.6.3 and insulation resistance is as per 12.7.6.4.</b></p>
<p><b>12.7.6.2</b> <i>Impulse voltage test</i></p>	<p>The impulse of 6kV is applied ten times with one polarity and then repeated with the other polarity. The minimum time between the impulses shall be 3 s. The waveform and the generator characteristics shall be in accordance with <b>IEC 61000-4-5 (1995-03) 'Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section S Surge immunity test'</b>.</p>	<p>The impulse of 6 kV is applied ten times with one polarity and then repeated with the other polarity. The minimum time between the impulses shall be 3 s. The waveform and the generator characteristics shall be in accordance with <b>IS 2071 (Part 1) with source impedance 500 ohm ± 50 ohm and source energy 0.5J ± 0.05J.</b></p>
<p><b>12.7.6.3</b> <i>AC voltage test</i></p>	<p>The test voltage shall be substantially sinusoidal, having a frequency between 45 Hz and 55 Hz, and applied for one minute. The power source shall be capable of supplying at least 500 VA.</p>	<p>The test voltage shall be substantially sinusoidal, having a frequency between 45 Hz and 55 Hz, and applied for one minute <b>for type test and acceptance test. The test duration for routine test shall be minimum 5 s.</b> The power source shall be capable of supplying at least 500 VA.</p>

<p><b>12.7.6.4</b> <i>Insulation resistance test</i></p>	<p>The insulation resistance test shall be carried out in accordance with Table 22. The voltage shall be applied for a minimum of one minute (or more for the pointer of the insulation tester to have come practically to rest.</p>	<p>The insulation resistance test shall be carried out in accordance with Table 22. The voltage shall be applied for a minimum of one minute (for type test and acceptance test) or more for the pointer of the insulation tester to have come practically to rest. The insulation resistance test duration for routine test shall be minimum 5 s.</p>
<p><b>12.9 Test for Electromagnetic Compatibility (EMC)</b></p>	<p>12.9 Test for Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI) After these tests, the meter shall show no damage or change of information</p>	<p>12.9 Test for Electromagnetic Compatibility (EMC)  After these tests, the meter shall show no damage.</p>
<p><b>12.9.2 Test for Immunity to Electrostatic Discharge (ESD)</b>  2 New clause are added <b>12.9.2.1 Contact discharge</b> <b>12.9.2.2 Air discharge</b></p>	<p>The test shall be carried out according to IEC 61000-4-2 (1995-01) Electromagnetic Compatibility (EMC) Part 4 : Testing and measurement techniques —Section 2: Electrostatic discharge immunity test'. Under the following conditions:  Contact Discharge Test Voltage :8kV Test severity level :4 Number of discharges '10  Voltage and auxiliary circuits energized with reference voltage  Without any current in the current circuits and the current terminal should be open circuit.</p>	<p>The test shall be carried out according to IS14700 (Part 4/Sec 2), under the following conditions:  Tested as table top equipment.  The meter shall be in operating condition: a) Voltage circuits and auxiliary power supply circuits energized with reference voltages; and b) Without any current in the current circuits and the current terminals shall be open circuit.  <b>12.9.2.1 Contact discharge</b> a) <i>Direct Discharge</i> — The test voltage of 8 kV shall be applied to metallic parts accessible in normal operation.  Number of discharges = 10 (in both the polarity) b) <i>Indirect Discharge</i> — The test voltage of 8kV shall be applied to both vertical and horizontal coupling planes in contact mode. In both vertical and horizontal plane, all faces of meter shall be exposed to the discharge.  Number of discharges = 10 ( in both the polarity) <b>12.9.2.2 Air discharge</b> a) <i>Direct Discharge</i> — The test voltage of 15kV shall be applied to non-metallic parts</p>

		<p>accessible in normal operation.</p> <p>Number of discharges = 10 (in both the polarity)</p>
<p><b>12.9.3</b> Test for Immunity to Electromagnetic HF Fields</p>	<p>The test shall be carried out according to EC61000-4-3 (1995-03) 'Electromagnetic compatibility (EMC) — Part 4; Testing and measurement techniques— Section 3: Radiated, radio-frequency electromagnetic field immunity test' under the following conditions:</p>	<p>The test shall be carried out according to IS 14700 (Part 4/Sec 3) or IEC 61000-4-20 under the following conditions:</p>
<p><b>12.9.3.1</b> and <b>12.9.3.2</b> are added</p>	<p>a) Without any current and the current circuit should be open. The application of the HF field shall not produce a change in the register of more than 0.01 kWh and the test output shall not produce a signal equivalent to more than 0.01 kWh. These values are based on the rated current of 5A and 100 V of the meter. For other voltage and current ratings the value 0.01 kWh has to be converted accordingly.</p> <p>b) Test with current:</p> <p>i) Meter in operating condition;</p> <p>ii) Voltage and auxiliary circuits energized with reference voltage;</p> <p>iii) Basic current <math>I_b</math> and <math>\cos\theta=1</math></p> <p>During the test, the behavior of the equipment shall not be perturbed and the variation of error shall be within the limits as specified in table 17. Frequency at which the meter is affected shall be reported.</p>	<p><b>12.9.3.1</b> Without any current and the current circuit should be open</p> <p>The application of the HF field shall not produce a change in the register of more than 0.01 kWh and the test output shall not produce a signal equivalent to more than 0.01 kWh. These values are based on the rated current of 5A and 100 V of the meter. For other voltage and current ratings, the value 0.01 kWh has to be converted accordingly.</p> <p><b>12.9.3.2</b> Test with current</p> <p>a) Meter in operating condition.</p> <p>b) Voltage and auxiliary circuits energized with reference voltage.</p> <p>c) Basic current <math>I_b</math> and <math>\cos\theta = 1</math></p> <p>During the test, the behavior of the equipment shall not be perturbed and the variation of error shall be within the limits as specified in Table 17. Frequency at which the meter is affected shall be reported.</p>

<p><b>12.9.4 Fast Transient Burst Test</b></p>	<p>a) Without any current in the current circuit and current terminals shall be open circuit.</p> <ul style="list-style-type: none"> <li>- meter in operating condition:</li> <li>- voltage and auxiliary circuits energized with reference voltage; test voltage on the current and voltage circuit: 4 kV;</li> <li>- duration of the test : 60 s;</li> <li>- Tested as table-top equipment.</li> </ul> <p>b) With basic current <math>I_b</math> and power factor equal to 1</p> <ul style="list-style-type: none"> <li>- voltage and auxiliary circuits energized with reference voltage;</li> <li>- test voltage on the current and voltage circuit: 2 kV;</li> <li>- test voltage on the auxiliary circuits with reference voltage over 40 V : 1 kV;</li> <li>- duration of the test: a fast transient burst of 1 s commences the test. followed by a 300 s non-active period. The test cycle is then repeated until a minimum test time of 10 min has been completed (the actual test time will depend on the resolution of the meter register; a resolution of at least 0.4% and 0.6 % is required from class 1 and class 2 respectively).</li> <li>- Tested as table top equipment;</li> </ul> <p>c) Test voltage applied between:</p> <ul style="list-style-type: none"> <li>— The terminals of each circuit</li> </ul>	<p>The test shall be carried out according to IS 14700 (Part 4/Sec 4) under the following conditions:</p> <ul style="list-style-type: none"> <li>a) Tested as table top equipment;</li> <li>b) Meter in operating condition: <ul style="list-style-type: none"> <li>1) Voltage and auxiliary circuits energized with reference voltage, or</li> <li>2) With basic current in current circuit, PF is unity.</li> </ul> </li> <li>c) Cable length between coupling device and EUT: 1m</li> <li>d) Test voltage shall be applied in common mode (line to earth) to: <ul style="list-style-type: none"> <li>1) The voltage circuits;</li> <li>2) The current circuits, if separated from the voltage circuits in normal operation; or</li> <li>3) The auxiliary circuit; if separated from the voltage circuits in normal operation.</li> </ul> </li> <li>e) Test voltage on current and voltage circuit: 4kV</li> <li>f) Test voltage on auxiliary circuits with a reference voltage above 40V: 2kV</li> <li>g) Duration of test : 60 s at each polarity</li> </ul> <p>NOTE — Accuracy may be determined by the registration method or other suitable means.</p> <p>During the test, temporary degradation or loss of function or performance is acceptable, nevertheless the variation of the error shall be within the limits as specified in Table 17.</p>
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	<p>normally connected to mains;</p> <ul style="list-style-type: none"> <li>— Any two independent circuits having reference voltage over 40 V; and</li> <li>— Each independent circuit having reference voltage over 40 V and earth.</li> </ul> <p>The qualifying conditions for the tests are:</p> <ol style="list-style-type: none"> <li>i. In case (a) above: During the test, there shall not be a change in the register of more than 0.01 kWh and the test output shall not produce a signal equivalent to more than 0.01 kWh. These values are based on the rated current of 5 A and reference voltage of 100 V of the meter. For the other voltage and current ratings the value of 0.01 kWh has to be converted accordingly.</li> <li>ii. In case (b) above: The advance ment in registration during this test shall not vary by more than 4% or 6% for meters of Class I and 2 respectively from a test under the same load conditions without application of the transients.’</li> </ol>	
<p><b>12.9.5</b> <i>Surge Immunity Test</i> ↑ This test has been added</p>		<p>The test shall be carried out according to IS 14700 (Part 4/Sec 5) under the following conditions with meter in operating condition:</p> <ol style="list-style-type: none"> <li>a) Voltage and auxiliary circuits energized with reference voltage;</li> <li>b) Without any current in the current circuits and the current terminals shall be open circuit;</li> <li>c) Cable length between surge generator and meter: 1 m</li> <li>d) Tested in differential mode (line to line);</li> <li>e) Phase angle: pulses to be applied at 60° and 240° relative to zero crossing of ac</li> </ol>

		<p>supply;</p> <p>f) Test voltage on the current and voltage circuits (main lines): 4 kV, generator source impedance: 2 Ohm</p> <p>g) Test voltages on auxiliary circuits with a reference voltage over 40V: 1kV; Generator source impedance: 42 ohm;</p> <p>h) Number of tests: 5 positive and 5 negative; and</p> <p>j) Repetition rate: maximum 1/min.</p> <p>The application of test shall not produce change in register of more than 0.01 kWh and the test output shall not produce a signal equivalent to more than 0.01 kWh. These values are based on the rated current of 5A and 100 V of the meter. For other voltage and current ratings the value 0.01 kWh has to be converted accordingly.</p> <p>During the test, a temporary degradation or loss of function or performance is acceptable.</p>
<p><b>12.9.6</b> <i>Radio Interference Measurement</i></p>	<p>The test for radio interferences shall be carried out for the frequencies from 0.15 MHz to 30 MHz and for the frequencies from 30 MHz to 300 MHz as per IS 6842.</p>	<p>The test for radio interference shall be carried out as per IS 6873 (Part 2/Sec 1). The input to be applied to meter during test is reference voltage, load current between <math>0.1 I_b</math> to <math>I_b</math> at UPF.</p> <p>a) <i>Test for conducted emission for the frequency range 0.15 Mhz to 30 Mhz.</i></p> <p>The test shall be carried out on mains part as per clause 4.3.3 of IS 6873 (Part 2/Sec 1). For mains parts, the limit specify in column 2 and 3 of Table 5 of IS 6873 (Part 2/Sec 1) apply.</p> <p>b) <i>Test for radiated emission for frequency range 30 Mhz to 300 Mhz.</i></p> <p>The test shall be carried out as per clause 5.3.3 or 5.3.4 of IS 6873 (Part 2/Sec 1). The limits specified in column 2 and 3 of Table 7 or of Table 9 respectively, of IS 6873 (Part 2/Sec 1) apply.</p>



<p><b>12.10 Test of Accuracy Requirements</b></p> <p><b>12.10.1 General Test Conditions</b></p>	<p>d) The minimum test period at any test point shall contain sufficient number of cycles <b>(more than 1 000)</b> to take care instantaneous power variation within a cycle. The maximum test period is however determined by homogeneity and resolution of test output (see 6.11);</p> <p><b>*f) The accuracy of the meter at reference conditions shall remain within accuracy class after completion of any type test, irrespective of the variation allowed during the particular type test.*</b></p>	<p>d) The minimum test period at any test point shall contain sufficient number of power cycles <b>(not less than 20 seconds)</b> to take care instantaneous power Variation within a cycle. The maximum test period is however determined by homogeneity and resolution of test output (see 6.11);</p> <p><b>f) This requirement has been removed.</b></p>
<p><b>12.13 Test of No-Load Condition</b></p>	<p>For this test the current circuit <b>must</b> be open circuit and a voltage of 115 percent of the reference voltage shall be applied to the voltage circuits</p>	<p>When the voltage is applied with no current flowing in the current circuit, the test output of the meter shall not produce more than one pulse.</p> <p>For this test, the current circuit <b>shall</b> be open-circuit and a voltage of 115 percent of the reference voltage shall be applied to the voltage circuits.</p> <p>The minimum test period <math>\Delta t</math> shall be:</p> <p><b><math>\Delta t = (600 \times 10^6) / (k m U_n I_{max}) \pm 2</math> min for meters of class 1</b></p> <p><b><math>\Delta t = (480 \times 10^6) / (k m U_n I_{max}) \pm 2</math> min for meters of class 2</b></p> <p>Where</p> <p><math>k</math> = the number of pulses emitted by the output device of the meter per kilowatt hour(imp/kWh);</p> <p><math>m</math> = the number of measuring elements;</p> <p><math>U_n</math> = the reference voltage in volts; and</p> <p><math>I_{max}</math> = the maximum current in amperes.</p> <p>For transformer-operated meters with primary or half-primary registers, the constant <math>k</math> shall correspond to the secondary values (voltage and currents).</p> <p style="text-align: center;">↑</p>

		Test method has been modified.
<b>12.17 Repeatability of Error Test</b>	<p>Test shall be carried out at 0.05i<sub>b</sub>, I<sub>b</sub> at UPF load under reference test conditions. Twenty error samples shall be taken at time-intervals of 30 min. Identical test condition shall be maintained throughout the test.</p> <p>For acceptance test six error tests may be carried out at time interval of at least 5 min.</p>	<p>Test shall be carried out at 0.05 I<sub>b</sub>, I<sub>bat</sub> UPF load under reference test conditions. Six error samples shall be taken by keeping a gap of time-intervals of 5 minutes between each sample. Identical test condition shall be maintained throughout the test. For error test duration, refer 6.11.</p> <p>Requirement fixed under 11.7 shall be satisfied.</p> <p style="text-align: center;">↑</p> <p>Test method has been modified.</p>
<b>ANNEX C TEST CIRCUIT DIAGRAM FOR DC AND EVEN HARMONICS</b>	Note2. The balancing impedance could most conveniently be a meter of same type as the EUT	<p>Modified notes:</p> <p>2. It is recommended to use a meter of same type as the EUT in place of balancing impedance.</p> <p>6. With above connections, the EUT will measure half of the energy measured by standard meter.</p>
<b>ANNEX G RECOMMENDED SAMPLING PLAN</b>	Tests of insulation resistance, a.c. voltage tests, test of power consumption, test of meter constant/registration, limits of error and interpretation of test results and adjustment (if required).	<b>G-3.2</b> Tests of Insulation Resistance, a.c. Voltage Tests, Test of Power Consumption, Test of Meter Constant/Registration and Limits of Error

<b>ANNEX H</b>  <b>STANDARD CONNECTION DIAGRAMS</b>	<b>(ALTERNATE CONNECTION — applicable only for <math>I_{max} &gt; 100 A</math>)</b>	In fig. H-7, following line is added (Meters with no terminals for current circuits, i.e., load current carrying conductors are not terminated at the meter and are passed through current measuring sensors)
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## Comparison of Tables

IS 13779 : 1999			IS 13779 : 2020		
(1)			(2)		
<b>Table 1 Standard Reference Voltages</b>			<b>Table 1 Standard Reference Voltages</b>		
<b>Meters for</b>	<b>Standard Reference Voltage (V)</b>	<b>Exceptional Values (V)</b>	<b>Meters for</b>	<b>Standard Reference Voltage (V)</b>	<b>Exceptional Values (V)</b>
1)	(2)	(3)	(1)	(2)	(3)
[ Clause 5.1 ]			[ Clause 5.1 ]		
Connection through voltage transformer	57.7 (100), 63.5 (110)	100 (173)	Connection through voltage transformer	63.5 (110)	57.7(100), 100 (173)
Direct connection and through current transformer only	230 (400), 240 (415)	220 (380), 250 (433)	Direct connection and through current transformer only	240 (415)	220(380), 230(400), 250(433)
<b>Table 6 Current Markings</b>			<b>Table 6 Current Markings</b>		
[ Clause 7.1(g) ]			[ Clause 7.1(g) ]		
<b>Type of Meter</b>	<b>Method of Marking</b>	<b>Example</b>	<b>Type of Meter</b>	<b>Method of Marking</b>	<b>Example</b>
(1)	(2)	(3)	(1)	(2)	(3)
1-phase , whole current, $I_b 10 A, I_{MAX} 20 A$	Basic current and rated maximum current	10-20 A	1-phase , whole current, $I_b 10 A, I_{MAX} 20 A$	Basic current and rated maximum current	10-20 A
1-phase , transformer operated, $I_b 1 A, I_{MAX} 1.2 A$	Basic current	-1A	1-phase , transformer operated, $I_b 1 A, I_{MAX} 1.2 A$	Basic current and rated maximum current	-1(1.2) A
3-phase , whole current, $I_b 50 A, I_{MAX} 60 A$	Basic current	50 A	3-phase , whole current, $I_b 50 A, I_{MAX} 60 A$	Basic current and rated maximum current	50 – 60 A
3-phase , transformer operated, $I_b -/5A, I_{MAX} 6 A$	Basic current	-/5 A	3-phase , transformer operated, $I_b -/5A, I_{MAX} 6 A$	Basic current and rated maximum current	-/5 (6) A

Table 7 Temperature Range ( Clause8.1 )				Table 7 Temperature Range ( Clause8.1 )			
SI No. (1)	Parameter (2)	Temperature Range for Indoor meter (3)	Temperature Range for Outdoor meter (4)	SI No. (1)	Parameter (2)	Temperature range for Indoor Meter (3)	Temperature range for Outdoor Meter (4)
i)	Specified operating range	0°C to +55°C	-10°C to +55°C	i)	Specified operating range	0°C to +55°C	-10°C to +55°C
ii)	Limit range of operation	-10°C to +60°C	-10°C to +70°C	ii)	Limit range of storage and transport	-25°C to +70°C	-25°C to +70°C
iii)	Limit range of storage and transport	-10°C to +70°C	-10°C to +70°C				

  

Table 17 Influence Quantities ( Clauses9.2.1 and 11.2 )						Table 17 Influence Quantities ( Clauses9.2.1 and 11.2 )					
SI No. (1)	Influence Quantities (2)	Value of Current (Balanced Unless Otherwise Stated) (3)	Power Factor (4)	Limit of Variation in Percentage Error for Meters of Class (5) (6)		SI No. (1)	Influence Quantities (2)	Value of Current (Balanced Unless Otherwise Stated) (3)	Power Factor (4)	Limit of Variation in Percentage Error for Meters of Class 1 2 (5) (6)	
i)	Voltage variation ±10 percent (see Note 1)	I <sub>b</sub>	1	0.7	1.0	i)	Voltage variation ±10 percent (see Note 1)	I <sub>b</sub>	1	0.7	1.0
			0.5 lagging	1.0	1.5				0.5 lagging	1.0	1.5
ii)	Frequency variation ±5 percent	I <sub>b</sub>	1	0.8	1.3	ii)	Frequency variation ±5 percent	I <sub>b</sub>	1	0.8	1.3
			0.5 lagging	1.0	1.5				0.5 lagging	1.0	1.5
iii)	Wave form: 10 percent of third harmonic in the current (see Note 2)	I <sub>b</sub>	1	0.6	0.8	iii)	Wave form: 10 percent of third harmonic in the current (see Note 2)	I <sub>b</sub>	1	0.6	0.8
iv)	Reversed phase sequence	0.1 I <sub>b</sub>	1	1.5	1.5	iv)	Reversed phase sequence	0.1 I <sub>b</sub>	1	1.5	1.5
v)	Voltage unbalance (see Note 3)	I <sub>b</sub>	1	2.0	4.0	v)	Voltage unbalance (see Note 3)	I <sub>b</sub>	1	2.0	4.0
vi)	DC and even harmonics in AC current circuit (see Note 4)	0.5 I <sub>b</sub> ≤ I <sub>b</sub> ≤ 0.5 I <sub>max</sub>	1	3.0	6.0	vi)	DC and even harmonics in AC current circuit (see Note 4)	Refer Annex C	1	3.0	6.0
vii)	Continuous magnetic induction of external origin (see Note 5)	I <sub>b</sub>	1	2.0	3.0	vii)	Continuous magnetic induction of external origin (see Note 5)	I <sub>b</sub>	1	2.0	3.0
viii)	Magnetic induction of external origin 0.5 mT (see Note 6)	I <sub>b</sub>	1	2.0	3.0	viii)	Magnetic induction of external origin 0.5 mT (see Note 6)	I <sub>b</sub>	1	2.0	3.0
ix)	Electromagnetic HF fields (see Note 7)	I <sub>b</sub>	1	2.0	3.0	ix)	Electromagnetic HF fields (see Note 7)	I <sub>b</sub>	1	2.0	3.0
x)	Operation of accessories (see Note 8)	0.05 I <sub>b</sub>	1	0.5	1.0	x)	Operation of accessories (see Note 8)	0.05 I <sub>b</sub>	1	0.5	1.0
xi)	Continuous 'abnormal'	I <sub>b</sub>	1	4.0	4.0	xi)	Continuous 'abnormal'	I <sub>b</sub>	1	4.0	4.0

<p>magnetic induction of external origin (see Note 9)</p> <p>xii) 'Abnormal' ac magnetic induction of external origin 10mT (see Note 9)</p> <p>Ib                      1                      4.0                      4.0</p>	<p>magnetic induction of external origin (see Note 9)</p> <p>xii) 'Abnormal' ac magnetic induction of external origin 10mT (see Note 9)</p> <p>Ib                      1                      4.0                      4.0</p> <p><b>xiii) Electrical fast transient burst (see Note 10)</b></p> <p><b>Ib                      1                      4.0                      6.0</b></p>
<p>Notes are inserted from the amendment</p>	<p>NOTES</p> <p><b>1</b> For the voltage ranges from -20 percent to -10 percent and +10 percent to +20 percent, the limits of variation in percentage error are three times the values given in Table 17.</p> <p>Below 0.8 Vref and upto 0.7 Vref, the said limits are five times the value given in Table 17.</p> <p>Below 0.7 Vref the error of the meter may vary between +10 percent and -100 percent.</p> <p><b>2</b> The distortion factor of the voltage shall be less than 1 percent. The variation in percentage error shall be measured under two conditions. The peak of third harmonic in the first measurement in phase and in the second measurement in antiphase of the peaks of the fundamental current.</p> <p><b>3</b> The polyphase meter shall measure and register within the variation in percentage error limits shown in Table 17 if one or the two phases of the 3-phase network are interrupted, provided the reference phase is available that is Y-phase for 3-phase 3-wire meters and neutral for 3-phase 4-wire meters. However, the operation of the meter shall not be affected by such removal of reference phase</p> <p><b>4</b> The test conditions are given in Annex C. This test does not apply to transformer operated meters.</p> <p><b>5</b> The test conditions are specified in <b>12.11</b>.</p> <p><b>6</b> A magnetic induction of external origin of 0.5 mT produced by a current of the same frequency as that of the voltage applied to the meter and under the most unfavourable conditions of phase and direction shall not cause a variation in the percentage error of the meter exceeding the values shown in Table 17. The test conditions are specified in <b>12.11</b>.</p> <p><b>7</b> The test conditions are specified in <b>12.9.3</b></p> <p><b>8</b> Such an accessory, enclosed in the meter case is energized intermittently, for example, the electromagnet of a multi-rate register.</p> <p><b>9</b> The test conditions are specified in <b>12.11</b>. In the event of logging of abnormal magnetic induction with date and time, the positive variation may be beyond the limit of 4 percent but not exceeding a power value equivalent to the product of rated voltage and maximum current.</p> <p><b>10</b> The test conditions are specified in <b>12.9.4</b>.</p>

<p align="center"><b>Table 20 Schedule of Type Tests</b> ( Clauses 12.2, 12.2.2 and 12.2.3 )</p> <table border="0"> <tr><td>4.1</td><td>Radio interference measurement</td><td>12.9.5</td></tr> <tr><td>4.2</td><td>Fast transient burst test</td><td>12.9.4</td></tr> <tr><td>4.3</td><td>Test of immunity to electrostatic discharges</td><td>12.9.2</td></tr> <tr><td>4.4</td><td>Test of immunity to electromagnetic HF field</td><td>12.9.3</td></tr> </table>	4.1	Radio interference measurement	12.9.5	4.2	Fast transient burst test	12.9.4	4.3	Test of immunity to electrostatic discharges	12.9.2	4.4	Test of immunity to electromagnetic HF field	12.9.3	<p align="center"><b>Table 20 Schedule of Type Tests</b> ( Clauses 12.2, 12.2.2 and 12.2.3 )</p> <table border="0"> <tr><td>4.1</td><td>Radio interference measurement</td><td>12.9.6</td></tr> <tr><td>4.2</td><td>Fast transient burst test</td><td>12.9.4</td></tr> <tr><td>4.3</td><td>Test of immunity to electrostatic discharges</td><td>12.9.2</td></tr> <tr><td>4.4</td><td>Test of immunity to electromagnetic HF field</td><td>12.9.3</td></tr> <tr><td>4.5</td><td><b>Surge immunity test</b></td><td><b>12.9.5</b></td></tr> </table>	4.1	Radio interference measurement	12.9.6	4.2	Fast transient burst test	12.9.4	4.3	Test of immunity to electrostatic discharges	12.9.2	4.4	Test of immunity to electromagnetic HF field	12.9.3	4.5	<b>Surge immunity test</b>	<b>12.9.5</b>	
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Voltage Tests</b> ( Clause 12.7.6.3 )</p> <table border="0"> <thead> <tr> <th align="center">Test Voltage (r.m.s.)</th> <th align="center">Points of Application of the Test Voltage</th> </tr> <tr> <th align="center">(1)</th> <th align="center">(2)</th> </tr> </thead> <tbody> <tr> <td>2 kV</td> <td>Test to be carried out with the case closed, cover and terminal cover in place a) Between, on the one hand, all the current and voltage circuits as well as the auxiliary circuits whose reference voltage is over 40 V, connected together, and, on the other hand, earth b) Between circuits not intended to be connected together in service</td> </tr> <tr> <td>4 kV</td> <td>additional tests for insulating encased meters a) Between, on the one hand, all the current and voltage circuits as well as the auxiliary circuits whose reference voltage is over 40 V, connected together, and, on the other hand, earth <b>b) Between circuits not intended to be connected together in service</b></td> </tr> <tr> <td>-</td> <td>c) visual inspection for compliance with the conditions of 6.7</td> </tr> <tr> <td>40 V (for test in item d), if applicable</td> <td>d) between on the one hand, all conductive parts inside the meter, connected together and, on the other hand, all conductive parts outside the meter case that are accessible with the test finger connected together</td> </tr> </tbody> </table> <p><b>Note</b></p>	Test Voltage (r.m.s.)	Points of Application of the Test Voltage	(1)	(2)	2 kV	Test to be carried out with the case closed, cover and terminal cover in place a) Between, on the one hand, all the current and voltage circuits as well as the auxiliary circuits whose reference voltage is over 40 V, connected together, and, on the other hand, earth b) Between circuits not intended to be connected together in service	4 kV	additional tests for insulating encased meters a) Between, on the one hand, all the current and voltage circuits as well as the auxiliary circuits whose reference voltage is over 40 V, connected together, and, on the other hand, earth <b>b) Between circuits not intended to be connected together in service</b>	-	c) visual inspection for compliance with the conditions of 6.7	40 V (for test in item d), if applicable	d) between on the one hand, all conductive parts inside the meter, connected together and, on the other hand, all conductive parts outside the meter case that are accessible with the test finger connected together	<p align="center"><b>Table 21 a. c. 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<p style="text-align: right;"><b>note 2)</b></p> <p>1) If the tests are made at a temperature other than the reference temperature, including permissible tolerances, the results shall be corrected by applying the appropriate temperature coefficient of the meter.</p> <p>2) The test consists of:</p> <p>a) For a single-phase meter, determining the errors at first with the meter normally connected to the mains and then after inverting the connections to current circuits as well as to the voltage circuits. Half of the difference between the two errors is the value of the variation of error. Because of the unknown phase of the external field, the test has to be made at 0.1 unity power factor and 0.2 f, at 0.5 lag power factor.</p> <p>b) For a three-phase meter, making three measurements at 0.1 f, at unity power factor, after each of which the connections to the current circuits and to voltage circuits are changed over 120° while the phase sequence is not altered. The greatest difference between each of the errors so determined and their average value is the value of the variation of error.</p> <p>3) The reference conditions for voltage and frequency apply to both the measuring circuit and the auxiliary supply (i.e.).</p> <p>4) This magnetic induction is that at the place of test without the presence of the meter and its connections.</p>	<table border="0"> <tr> <td style="vertical-align: top;">iv)</td> <td style="vertical-align: top;">Waveform</td> <td style="vertical-align: top;">Sinusoidal voltage and current</td> <td style="vertical-align: top;">Distortion factor less than 2 percent</td> </tr> <tr> <td style="vertical-align: top;">v)</td> <td style="vertical-align: top;">Magnetic induction of external origin at the reference frequency</td> <td style="vertical-align: top;">Magnetic induction equal to zero (see Note 3)</td> <td style="vertical-align: top;">± 0.05 mT</td> </tr> </table> <p>NOTES:</p> <p>1 If the tests are made at a temperature other than the reference temperature, including permissible tolerances, the results shall be corrected by applying the appropriate temperature coefficient of the meter.</p> <p>2 The reference conditions for voltage and frequency apply to both the measuring circuit and the auxiliary supply (ies).</p> <p>3 This magnetic induction is that at the place of test without the presence of the meter and its connections.</p>	iv)	Waveform	Sinusoidal voltage and current	Distortion factor less than 2 percent	v)	Magnetic induction of external origin at the reference frequency	Magnetic induction equal to zero (see Note 3)	± 0.05 mT
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