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2003-02

Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 11: Metering equipment

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Commission Electrotechnique Internationale
International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING EQUIPMENT (AC) –
GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –****Part 11: Metering equipment**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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<https://www.internationalstandards.org/> International Standard IEC 62052-11 has been prepared by IEC technical committee 13: Equipment for electrical energy measurement and load control.

The text of this standard is based on the following documents:

FDIS	Report on voting
13/1285/FDIS	13/1292/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2012. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

This part of IEC 62052 is to be used with relevant parts of the IEC 62052, IEC 62053 and IEC 62059 series, Electricity metering equipment:

- IEC 62053-11:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 11: Electromechanical meters for active energy (classes 0,5, 1 and 2)*
Replaces particular requirements of IEC 60521:1988 (2nd edition)
- IEC 62053-21: 2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)*
Replaces particular requirements of IEC 61036: 2000 (2nd edition)
- IEC 62053-22:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*
Replaces particular requirements of IEC 60687:1992 (2nd edition)
- IEC 62053-23:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)*
Replaces particular requirements of IEC 61268:1995 (1st edition)
- IEC 62053-31:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)*
- IEC 62053-61:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 61: Power consumption and voltage requirements*
- IEC 62059-11:2002, *Electricity metering equipment (a.c.) – Dependability – Part 11: General concepts*
- IEC 62059-21:2002, *Electricity metering equipment (a.c.) – Dependability – Part 21: Collection of meter dependability data from the field*

This part is a standard for type testing electricity meters. It covers the general requirements for “normal meters” being used indoors and outdoors in large quantities worldwide. It does not deal with special implementations (such as metering-part and/or displays in separate housings).

This standard is intended to be used in conjunction with the appropriate part of IEC 62053 for the type of equipment under consideration.

This standard distinguishes between

- meters intended to be used indoors and outdoors; and
- protective class I and protective class II meters.

The test levels are regarded as minimum values to guarantee the proper functioning of the meter under normal working conditions. For special application, other test levels might be necessary and should be agreed upon between the user and the manufacturer.

ELECTRICITY METERING EQUIPMENT (AC) – GENERAL REQUIREMENTS, TESTS AND TEST CONDITIONS –

Part 11: Metering equipment

1 Scope

This part of IEC 62052 covers type tests for electricity metering equipment for indoor and outdoor application and applies to newly manufactured equipment designed to measure the electrical energy on 50 Hz or 60 Hz networks, with a voltage up to 600 V.

It applies to electromechanical or static meters for indoor and outdoor application consisting of a measuring element and register(s) enclosed together in a meter case. It also applies to operation indicator(s) and test output(s). If the meter has a measuring element for more than one type of energy (multi-energy meters), or when other functional elements, such as maximum demand indicators, electronic tariff registers, time switches, ripple control receivers, data communication interfaces, etc. are enclosed in the meter case, then the relevant standards for these elements apply.

It does not apply to:

- a) portable meters;
- b) data interfaces to the register of the meter;
- c) reference meters.

For rack-mounted meters, the mechanical properties are not covered in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038:1983, *IEC standard voltages*
Amendment 1:1994,
Amendment 2:1997

IEC 60044-1:1996, *Instrument transformers – Part 1: Current transformers*

IEC 60044-2:1997, *Instrument transformers – Part 2: Inductive voltage transformers*

IEC 60050-300:2001, *International Electrotechnical Vocabulary – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*
Amendment 1:1993,
Amendment 2:1994

IEC 60068-2-2:1974, *Basic environmental testing procedures – Part 2: Tests – Tests B: Dry heat*
Amendment 1:1993,
Amendment 2:1994

IEC 60068-2-5:1975, *Basic environmental testing procedures – Part 2: Tests – Test Sa: Simulated solar radiation at ground level*

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11:1981, *Basic environmental testing procedures – Part 2: Tests – Test Ka: Salt mist*

IEC 60068-2-27:1987, *Basic environmental testing procedures – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:1980, *Basic environmental testing procedures – Part 2: Tests – Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)*

IEC 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60085:1984, *Thermal evaluation and classification of electrical insulation*

IEC 60359:2001, *Electrical and electronic measurement equipment – Expression of performance*

IEC 60387:1992, *Symbols for alternating-current electricity meters*

IEC 60417-2:1998, *Graphical symbols for use on equipment – Part 2: Symbols originals*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*
Amendment 1:1999

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60721-3-3:1994, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 3: Stationary use at weatherprotected locations*
Amendment 1:1995,
Amendment 2:1996

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test. Basic EMC publication*

IEC 61000-4-3:2002, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test*. Basic EMC publication

IEC 61000-4-5:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test*

IEC 61000-4-6:1996, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-12:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 12: Oscillatory waves immunity test*. Basic EMC publication

IEC 62053-31:1998, *Electricity metering equipment (a.c.) – Particular requirements – Part 31: Pulse output devices for electromechanical and electronic meters (two wires only)*

CISPR 22:1997, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*
Amendment 1:2000

ISO 75-2:1993, *Plastics – Determination of temperature of deflection under load – Part 2: Plastic and ebonite*

3 Terms and definitions

For the purposes of this International Standard, the following definitions apply.

Expression of the performance of electrical and electronic measuring equipment has been taken from IEC 60359.

Where there is a difference between the definitions in the glossary and those contained in product standards produced by TC 13, then the latter shall take precedence in applications of the relevant standard.

3.1 General definitions

3.1.1

electromechanical meter

meter in which currents in fixed coils react with the currents induced in the conducting moving element, generally (a) disk(s), which causes their movement proportional to the energy to be measured

3.1.2

static meter

meter in which current and voltage act on solid state (electronic) elements to produce an output proportional to the energy to be measured

3.1.3**watt-hour meter**

instrument intended to measure active energy by integrating active power with respect to time
[IEV 301-06-01]

3.1.4**var-hour meter**

instrument intended to measure reactive energy by integrating reactive power with respect to time
[IEV 301-06-02]

3.1.5**reactive power (var)**

reactive power for sinusoidal waveforms of any single frequency in a single phase circuit is defined as the product of the r.m.s. values of current and voltage and the sine of the phase angle between them.

NOTE Standards for reactive power apply for sinusoidal currents and voltages containing the fundamental frequency only.

3.1.6**reactive energy (var-hour)****3.1.6.1****reactive energy in a single-phase circuit**

the reactive energy in a single-phase circuit is the time integral of the reactive power as defined under 3.1.5

3.1.6.2**reactive energy in a polyphase circuit**

the algebraic sum of the reactive energies of the phases

NOTE The specification is based on reactive energy derived from sinusoidal current and voltage of fundamental frequencies, the inductive or capacitive state of a circuit in these recommendations is given by the factor "sin φ ".

3.1.7**multi-rate meter**

energy meter provided with a number of registers, each becoming operative for specified time intervals corresponding to different tariff rates

[IEV 313-06-09 modified]

3.1.8**meter type****3.1.8.1****meter type (for electromechanical meter)**

term used to define a particular design of meter, manufactured by one manufacturer, having:

- a) similar metrological properties;
- b) the same uniform construction of parts determining these properties;
- c) the same ratio of the maximum current to the reference current;
- d) the same number of ampere-turns for the current winding at reference current and the same number of turns per volt for the voltage winding at reference voltage.

The type may have several values of reference current and reference voltage.

Meters are designated by the manufacturer by one or more groups of letters or numbers, or a combination of letters and numbers. Each type has one designation only.

NOTE 1 The type is represented by the sample meter(s) intended for the type tests, whose characteristics (reference current and reference voltage) are chosen from the values given in the tables proposed by the manufacturer.

NOTE 2 Where the number of ampere-turns would lead to a number of turns other than a whole number, the product of the number of turns of the windings by the value of the basic current may differ from that of the sample meter(s) representative of the type.

It is advisable to choose the next number immediately above or below in order to have whole numbers of turns.

For this reason only may the number of turns per volt of the voltage windings differ, but by not more than 20 % from that of the sample meters representative of the type.

NOTE 3 The ratio of the highest to the lowest basic speed of the rotors of each of the meters of the same type shall not exceed 1,5.

3.1.8.2 meter type (for static meter)

term used to define a particular design of meter, manufactured by one manufacturer, having:

- a) similar metrological properties;
- b) the same uniform construction of parts determining these properties;
- c) the same ratio of the maximum current to the reference current.

The type may have several values of reference current and reference voltage.

Meters are designated by the manufacturer by one or more groups of letters or numbers, or a combination of letters and numbers. Each type has one designation only.

NOTE The type is represented by the sample meter(s) intended for the type tests, whose characteristics (reference current and reference voltage) are chosen from the values given in the tables proposed by the manufacturer.

3.1.9 reference meter

a meter used to measure the unit of electric energy. It is usually designed and operated to obtain the highest accuracy and stability in a controlled laboratory environment

3.2 Definitions related to the functional elements

3.2.1 measuring element

part of the meter which produces an output proportional to the energy

3.2.2 output devices

3.2.2.1 test output

device which can be used for testing the meter

3.2.2.2 operation indicator

device which gives a visible signal of the operation of the meter

3.2.2.3 pulse

wave that departs from an initial level for a limited duration of time and ultimately returns to the original level