IEC 62053-41

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electricity metering equipment – Particular requirements –
Part 41: Static meters for DC energy (classes 0,5 and 1)

Équipement de comptage de l'électricité – Exigences particulières –
Partie 41: Compteurs statiques d'énergie en courant continu (classes 0,5 et 1)

IEC 62053-41:2021-06(en-fr)

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ELECTRICITY METERING EQUIPMENT – PARTICULAR REQUIREMENTS –

Part 41: Static meters for DC energy (classes 0,5 and 1)

FOREWORD

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International Standard IEC 62053-41 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
13/1831/FDIS	13/1842/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of the IEC 62053 series, published under the general title *Electricity metering equipment – Particular requirements*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn,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

INTRODUCTION

This part of IEC 62053 is to be used with relevant parts of the IEC 62052, IEC 62057, IEC 62058 and IEC 62059 series, and with IEC 62055:

IEC 62052-11:2020, *Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*

IEC 62052-31:2015, *Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 31: Product safety requirements and tests*

IEC 62053-11:2003, *Electricity metering equipment (a.c.) – Particular requirements – Part 11: Electromechanical meters for active energy (classes 0,5, 1 and 2)*
IEC 62053-11:2003/AMD1:2016

IEC 62053-21:2020, *Electricity metering equipment – Particular requirements – Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)*

IEC 62053-22:2020, *Electricity metering equipment – Particular requirements – Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)*

IEC 62055-31:2005, *Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)*

IEC 62057-1: *Test equipment, techniques and procedures for electrical energy meters – Part 1: Stationary Meter Test Units (MTU)*[1]

IEC 62058-11:2008, *Electricity metering equipment (AC) – Acceptance inspection – Part 11: General acceptance inspection methods*

IEC 62058-21:2008, *Electricity metering equipment (AC) – Acceptance inspection – Part 21: Particular requirements for electromechanical meters for active energy (classes 0,5, 1 and 2)*

IEC 62058-31:2008, *Electricity metering equipment (AC) – Acceptance inspection – Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)*

IEC TR 62059-11:2002, *Electricity metering equipment – Dependability – Part 11: General concepts*

IEC TR 62059-21:2002, *Electricity metering equipment – Dependability – Part 21: Collection of meter dependability data from the field*

This part is a standard for type testing electricity meters. It covers the particular requirements for meters used indoors, as such applications are the most common. Using the meters outdoors is possible if the meter is placed in an additional meter cabinet providing suitable protection against environmental effects. It does not deal with special implementations (such as metering-part and/or displays in separate housings).

This document is intended to be used in conjunction with IEC 62052-11:2020 and with IEC 62052-31:2015. When any requirement in this document concerns an item already covered in IEC 62052-11:2020 or in IEC 62052-31:2015, the requirements of this document take precedence over the requirements of IEC 62052-11:2020 or of IEC 62052-31:2015.

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1 Under preparation. Stage at the time of publication: CCDV.

The test levels are regarded as minimum values that provide for the proper functioning of the meter under normal working conditions. For special applications, additional test levels might be necessary and are subject to an agreement between the manufacturer and the purchaser.

ELECTRICITY METERING EQUIPMENT – PARTICULAR REQUIREMENTS –

Part 41: Static meters for DC energy (classes 0,5 and 1)

1 Scope

This part of IEC 62053 applies only to static watt-hour meters of accuracy classes 0,5 and 1 for the measurement of DC electrical energy in DC systems, and it applies to their type tests only.

NOTE 1 For other general requirements, such as safety, dependability, etc., see the relevant parts of IEC 62052 or IEC 62059.

This document applies to electricity metering equipment designed to:

- measure and control electrical energy on electrical networks with two poles where one of the poles is connected to earth and with voltage up to 1 500 V DC;

NOTE 2 There are DC networks with other configurations or with more than 2 poles (for example networks with earth and both a positive and a negative pole).

- have all functional elements, including add-on modules, enclosed in, or forming a single meter case with the exception of indicating displays;
- operate with integrated or detached indicating displays, or without an indicating display;
- be installed in a specified matching socket or rack;
- optionally, provide additional functions other than those for measurement of electrical energy.

The electricity metering equipment covered by this document may be used for measuring DC electrical energy in the following, or similar, application areas:

- in EV (electrical vehicle) charging stations or in EV charging infrastructures, if the measurement is placed on the DC side;
- in information technology (IT) server farms;
- in DC supply points for communication equipment;
- in low voltage DC networks for residential or commercial areas, if the measurement is placed on the DC side;
- in solar PV (photovoltaic) systems where DC power generation is measured;
- in DC supply points for public transport networks (e.g. trolleybus, etc.).

Meters designed for operation with low power instrument transformers, LPITs as defined in the IEC 61869 series, may be tested for compliance with this document only if such meters and their LPITs are tested together and meet the requirements for directly connected meters.

NOTE 3 Modern electricity meters typically contain additional functions such as measurement of voltage magnitude, current magnitude, power, etc.; measurement of power quality parameters; load control functions; delivery, time, test, accounting, recording functions; data communication interfaces and associated data security functions. The relevant standards for these functions may apply in addition to the requirements of this document. However, the requirements for such functions are outside the scope of this document.

This document does not apply to:

- meters for which the voltage between the two poles, where one of the poles is connected to earth, exceeds 1 500 V DC;
- meters to be used in networks other than with two poles in which one of the poles is connected to earth;
- meters intended for connection with low power instrument transformers (LPITs as defined in the IEC 61869 series) when tested without such transformers;
- metering systems comprising multiple devices physically (except LPITs) remote from one another;
- portable meters;

NOTE 4 Portable meters are meters that are not permanently connected.

- meters used in rolling stock, vehicles, ships and airplanes;
- laboratory and meter test equipment;
- reference standard meters;
- data interfaces to the register of the meter;
- matching sockets or racks used for installation of electricity metering equipment;
- any additional functions provided in electrical energy meters.

This document does not cover measures for detection and prevention of fraudulent attempts to compromise a meter's performance (tampering).

NOTE 5 Nevertheless, specific tampering detection and prevention requirements, and test methods, as relevant for a particular market are subject to agreement between the manufacturer and the purchaser.

NOTE 6 Specifying requirements and test methods for fraud detection and prevention would be counterproductive, as such specifications would provide guidance for potential fraudsters.

NOTE 7 There are many methods of tampering with meters reported from various markets; designing meters to detect and prevent all kinds of tampering would lead to unjustified increase in costs of meter design, verification and validation.

NOTE 8 Billing systems, such as, smart metering systems, are capable of detecting irregular consumption patterns and irregular network losses which enable discovery of suspected meter tampering.

NOTE 9 This document does not specify emission requirements, these are specified in IEC 62052-11:2020, 9.3.14.

NOTE 10 DC meters for rolling stock are covered by other IEC standards, e.g., from TC 9 for railway applications: IEC 62888-1:2018, IEC 62888-2:2018, IEC 62888-3:2018, IEC 62888-4:2018, IEC 62888-5:2018.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61000-4-19:2014, *Electromagnetic compatibility (EMC) – Part 4-19: Testing and measurement techniques – Test for immunity to conducted, differential mode disturbances and signalling in the frequency range 2 kHz to 150 kHz at a.c. power ports*

IEC 62052-11:2020, *Electricity metering equipment – General requirements, tests and test conditions – Part 11: Metering equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62052-11:2020, as well as the following, apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia website: http://www.electropedia.org/
- ISO Online Browsing Platform website: http://www.iso.org/obp

3.1
direct current system
DC system
electrical system fed by unidirectional voltage

[SOURCE: IEC 60050-601:1985, 601-01-04]

3.2
direct current
electric current that is time-independent or, by extension, periodic current the direct component of which is of primary importance

Note 1 to entry: For the qualifier DC, see IEC 60050-151:2001, 151-15-02.

[SOURCE: IEC 60050-131:2002, 131-11-22]

3.3
direct voltage
voltage that is time-independent or, by extension, periodic voltage the direct component of which is of primary importance

[SOURCE: IEC 60050-131:2002, 131-11-23]

3.4
DC power
product of the direct voltage and the direct current (mean values)

[SOURCE: IEC 60050-551:1998, 551-17-09]

3.5
DC energy meter
instrument intended to measure DC energy

3.6
DC energy
electrical energy transformable into some other form of energy

Note 1 to entry: The coherent SI unit of active energy is joule, J. Another unit is watt hour. Its multiple, kilowatt hour, kWh, is commonly used for billing consumers of electric energy and is therefore indicated on electric energy meters.

Note 2 to entry: For pure DC signals, the DC energy is equal to the active energy which is the time integral of the DC power as defined in 3.1.25 of IEC 62052-11:2020.

4 Standard electrical values

4.1 Voltages

4.1.1 Nominal voltages

The values given in IEC 62052-11:2020 apply.

4.1.2 Voltage ranges

The values given in IEC 62052-11:2020 apply.

4.2 Currents

4.2.1 Nominal current

The values given in IEC 62052-11:2020 apply.

4.2.2 Starting current

The requirements and acceptance criteria of IEC 62052-11:2020 apply, see Table 1.

Table 1 – Starting current

Meters for	Starting current I_{st}	
	class 0,5	class 1
Direct connection	0,004 I_n	0,004 I_n

4.2.3 Minimum current

The requirements and acceptance criteria of IEC 62052-11:2020 apply, see Table 2.

Table 2 – Minimum current

Meters for	Minimum current I_{min} class 0,5 and class 1
Direct connection	0,05 I_n

4.2.4 Maximum current

The requirements and acceptance criteria of IEC 62052-11:2020 apply.

4.3 Power consumption

The power consumption in the voltage, current and auxiliary power supply circuits shall be determined at reference conditions given in 7.1 by any suitable method. The maximum uncertainty of the measurement of the power consumption shall not exceed 5 %.

The power consumption for the voltage and current circuits measured at reference temperature should not exceed the values shown in Table 3.

In case of meters specified for multiple values of voltage or current, the measurements shall be conducted using the values resulting in the worst case (highest) power consumption of the meter.