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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electricity metering – Payment systems – Part 31: Particular requirements – Static payment meters for active energy (classes 0,5, 1 and 2)

Équipements de comptage de l'électricité – Systèmes à paiement – Partie 31: Exigences particulières – Compteurs statiques à paiement d'énergie active (classes 0,5, 1 et 2)

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ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 31: Particular requirements – Static payment meters for active energy (classes 0,5, 1 and 2)

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IEC 62055-31 has been prepared by IEC technical committee 13: Electrical energy measurement and control. It is an International Standard.

This second edition cancels and replaces the first edition published in 2005. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Title modified.
b) Removal of the contents of Annex C relating to the requirements for the supply control switch, and added reference to IEC 62052-31:2015 which contains the relevant requirements.

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

Draft	Report on voting
13/1864/FDIS	13/1866/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 in the IEC 62055 series, published under the general title *Electricity metering – Payment systems*, 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- withdrawn,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

Payment meters are used in situations where the supply of electrical energy to the load may be interrupted or its restoration enabled under the control of the payment meter in relation to a payment tariff agreed between the customer and the supplier. The payment meter is part of a system that uses token carriers to pass payment information as tokens between a vending network and the payment meters that include the meter accounting process.

The primary reason for this edition is to align it with the requirements introduced in IEC 62052-31:2015 metering safety standard.

The functions of a payment meter are to measure electrical energy consumed and to decrement the available credit value in accordance with the metered consumption, and possibly in accordance with the passing of time. This available credit value is incremented as the result of payments made to the electricity supplier, and the meter accounting process continuously calculates the balance of available credit held by the customer. When the available credit value has been decremented to a predetermined value that is related to the payment mode in use, a switch is used to interrupt the supply to the customer's load. However, additional features may be present in the payment meter, which prevent or delay the opening of the switch, or limit further consumption to a low load level. Such "social" features may include the provision of an emergency credit facility, the possibility of operation in a fixed-payment mode, and the inhibiting of interruptions for certain periods of time.

In return for the payment (usually in cash) and depending on the particular type of system, the customer may be issued with a single-use token on a disposable token carrier for the equivalent value, or a reusable token carrier may be credited with that value, or the token may be transmitted directly to the meter via a communications network (a so-called virtual token carrier). "One-way" and "two-way" data transfer systems may be used, and the token carriers may be: physical devices such as smart cards, or other electronic devices, or magnetic cards; virtual token carriers where the token information is transferred by a remote communications system; or numeric token carriers where sequences of digits are issued on a paper receipt and entered via a keypad on the meter.

IEC 62051:1999, Clause 17 provides some details of payment metering terminology.

ELECTRICITY METERING – PAYMENT SYSTEMS –

Part 31: Particular requirements – Static payment meters for active energy (classes 0,5, 1 and 2)

1 Scope

This part of IEC 62055 applies to newly manufactured, static watt-hour payment meters of accuracy classes 0,5, 1 and 2 for direct connection, for the measurement of alternating current electrical energy consumption of a frequency in the range 45 Hz to 65 Hz that include a supply control switch for the purpose of interruption or restoration of the electricity supply to the load in accordance with the current value of the available credit maintained in the payment meter. It does not apply to static watt-hour payment meters where the voltage across the connection terminals exceeds 1 000 V (line-to-line voltage for meters for polyphase systems).

It applies to payment meters for indoor application, operating under normal climatic conditions where the payment meter is mounted as for normal service (i.e. together with a specified matching socket where applicable).

Payment meters are implementations where all the main functional elements are incorporated in a single enclosure, together with any specified matching socket. There are also multi-device payment metering installations where the various main functional elements, such as the measuring element, the user interface unit, token carrier interface, and the supply control switch are implemented in more than one enclosure, involving additional interfaces.

Functional requirements that apply to payment meters are also defined in this document, and include informative basic functional requirements and tests for the prepayment mode of operation in Annex A. Allowances are made for the relatively wide range of features, options, alternatives, and implementations that may be found in practice. The diverse nature and functionality of payment meters prevent the comprehensive specification of detailed test methods for all of these requirements. However, in this case, the requirements are stated in such a way that tests can then be formulated to respect and validate the specific functionality of the payment meter being tested.

This document does not cover specific functionality or performance requirements for circuit protection, isolation or similar purposes that may be specified through reference to other specifications or standards. Safety requirements removed from Edition 1.0 have been replaced with references to the safety requirements now contained in IEC 62052-31:2015, the product safety standard for newly manufactured electricity meters. In-service safety testing (ISST) is not covered by IEC 62052-31:2015 and is left to national best practice usually as an extension of existing in-service testing (IST) of metrology stability.

This document does not cover software requirements. This document covers type-testing requirements only. For acceptance testing, the requirements given in IEC 62058-11:2008 and IEC 62058-31:2008 may be used.

Dependability aspects are addressed in the IEC 62059 series of standards. Additional reliability, availability, maintenance and life cycle aspects are provided by IEC TC 56.

This document does not cover conformity tests and system compliance tests that may be required in connection with legal or other requirements of some markets.

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 60050-300:2001, *International Electrotechnical Vocabulary (IEV) – Part 300: 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 60050-300:2001/AMD1:2015
IEC 60050-300:2001/AMD2:2016
IEC 60050-300:2001/AMD3:2017
IEC 60050-300:2001/AMD4:2020

IEC TR 62051:1999, *Electricity metering – Glossary of terms*

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

IEC 62054-21:2004, *Electricity metering (a.c.) – Tariff and load control – Part 21: Particular requirements for time switches*
IEC 62054-21:2004/AMD1:2017

IEC TR 62055-21:2005, *Electricity metering – Payment systems – Part 21: Framework for standardisation*

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

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)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-300:2001, IEC 62051:1999, IEC 62052-11:2020, and IEC 62055-21:2005, as well as the following, apply.

NOTE Where there is a difference between definitions in IEC 62055-31 and those contained in other referenced IEC standards, then those defined in IEC 62055-31 take precedence.

3.1 General payment metering

3.1.1
AC withstand voltage
RMS value of sinusoidal power frequency voltage that the equipment can withstand during tests made under specified conditions and for a specified time

[SOURCE: IEC 60050-614:2016, 614-03-22, modified]

3.1.2
available credit value
value of available credit (in monetary or energy units) usable for further consumption that is either stored in the payment meter or calculated by it whenever required which includes social credit if implemented

3.1.3
fault current
current flowing at a given point of a network resulting from a fault at another point of this network

[SOURCE: IEC 60050-603:1986, 603-02-25]

3.1.4
load control switch
LCS
SEE: IEC 62052-31:2015, 3.7.3

3.1.5
load interface
terminal(s) where the customer's load circuit is connected to the payment meter, or to a specified matching socket, where applicable

3.1.6
multi-device payment metering installation
payment metering installation where the functional elements comprising the measuring element(s); register(s), storage, and control; meter accounting process; user interface including any physical token carrier interface; any virtual token carrier interface; load switch(es); auxiliaries; plus supply interface and load interface are not arranged in the form of a payment meter, but instead are partitioned into two or more devices that require appropriate mounting, connection, and commissioning

[SOURCE: IEC 62051:1999, 17.45]

3.1.7
payment meter
electricity meter with additional functionality that can be operated and controlled to allow the flow of energy according to agreed payment modes

Note 1 to entry: It includes the following functional elements: measuring element(s); register(s), storage, and control; meter accounting process and any time-based functions; user interface including any physical token carrier interface; any virtual token carrier interface; load switch(es); auxiliaries; plus supply interface and load interface. A payment meter takes the form of a single unit, or a main unit that also employs a single specified matching socket for the supply interface and load interface. In either case. some payment meter implementations may allow for some or all of any time-based functions to be provided by an external unit connected to the payment meter, such as a time switch, a ripple control receiver, or a radio receiver.

Note 2 to entry: Refer to Figure B.1 for the generalised block diagram of a payment meter instance.

[SOURCE: IEC 62051:1999, 17.47]

3.1.8
payment metering installation
set of payment metering equipment installed and ready for use at a customer's premises

Note 1 to entry: This includes mounting the equipment as appropriate, and where a multi-device payment metering installation is involved, the connection of each unit of equipment as appropriate. It also includes the connection of the supply network to the supply interface, the connection of the customer's load circuit to the load interface, and the commissioning of the equipment into an operational state as a payment metering installation.

3.1.9
prepayment mode
payment mode in which automatic interruption occurs when available credit value is exhausted

3.1.10
social credit
amount of additional credit for which the consumer has not paid in advance but shall be repaid or a period of time within which supply will not be interrupted despite credit exhaustion

3.1.11
specified matching socket
<in relation to a payment meter arranged as a plug-in unit>comprises a base with jaws to accept and connect to the plug-in unit, terminals for connection of the supply network and the consumer load circuit, and appropriate secure fixing and sealing arrangements

Note 1 to entry: The payment meter is capable of meeting the relevant type-testing requirements when it is properly installed in any specified matching socket.

3.1.12
supply control switch
SCS
SEE: IEC 62052-31:2015, 3.7.2

3.1.13
supply interface
terminal(s) where the supply network is connected to a payment meter, or to a specified matching socket, where applicable

3.1.14
time-based credit
payment meter accounting functions that deal with the calculation and transacting of a (social) grant of credit that is released on a scheduled time basis

Note 1 to entry: See IEC 62055-21:2005, 13.8.3.

3.1.15
user interface
that part of a payment meter or payment metering installation that allows the customer to monitor and operate the installation

Note 1 to entry: It may also facilitate meter reading and inspection, and metering services activities.

Note 2 to entry: Where physical token carriers are employed, it includes a token carrier interface.

3.2 Tokens

3.2.1
token
<equipment-related definition> information content including an instruction issued on a token carrier by a vending or management system that is capable of subsequent transfer to and acceptance by a specific payment meter, or one of a group of meters, with appropriate security

Note 1 to entry: In a more general sense, the token refers to the instruction and information being transferred, while the token carrier refers to the physical device being used to carry the instruction and information, or to the communications medium in the case of a virtual token carrier.

[SOURCE: IEC 62051:1999, 17.66]

<system-related definition> subset of data elements, containing an instruction and information, that is present in the APDU of the application layer of the POS to *Token Carrier Interface*, and which is also transferred to the payment meter by means of a token carrier

3.2.2
credit token
value token
token that represents an amount of credit in monetary or energy value for transfer from the vending point to the payment meter

3.2.3
duplicate token
token that contains the same information as a token that has already been issued, and hence may also be a valid token

Note 1 to entry: This is not the same as a replacement token (refer also to 3.4.9).

Note 2 to entry: A duplicate token is a reissue of the same token that was previously issued and is identical to it in all aspects; whereas a replacement token is a newly generated token in place of a previously generated token and may not be identical to it in all aspects.

3.2.4
multiple-use token
token (such as a test token) that can be used for more than one successful session in a payment meter or possibly with each in a group of meters

Note 1 to entry: These are typically used for meter reading or service purposes on repeated occasions.

3.2.5
no-value token
token that does not result in a financial advantage or disadvantage to the consumer, which may contain meter configuration data, or instructions to perform certain tests, or to display certain values on the user interface, or to retrieve certain data from the meter and return it on a token carrier

Note 1 to entry: This is as opposed to value token.

3.2.6
replacement token
SEE: 3.4.9

Note 1 to entry: This is not the same as a duplicate token (see 3.2.3).

3.2.7
single-use token
token (such as a credit token) that can only be used for one successful session in a payment meter

3.2.8
valid token
<in relation to a specific payment meter (or group of payment meters)>, token that is capable of being processed successfully by the meter(s)

3.2.9
value token
SEE:3.2.2

3.3 Token carriers

3.3.1
token carrier
<equipment-related definition> devices or media used to transport and present token information to payment meters, such as printed paper, magnetic card, electronic memory card/key, microprocessor card, or data communications networks

Note 1 to entry: The token carrier may also carry ancillary control or monitoring information to or from the payment meter, depending upon system type and requirements.

<system-related definition> medium that is used in the physical layer of the POS to *Token Carrier Interface*, onto which the token is modulated or encoded, and which serves to carry the token from the point where it is generated to the remote payment meter, where it is received

3.3.2
blank token carrier
physical token carrier that has not been processed at the vending point or elsewhere and hence contains no specific data

3.3.3
disposable token carrier
token carrier that is not capable of further use once it has been accepted or used, such as a paper-based magnetic card

3.3.4
machine-readable token carrier
physical or virtual token carrier carrying token information that is capable of being read and processed automatically on presentation to an appropriate payment meter, without further manual operation

EXAMPLE A token employing a magnetic card as the token carrier.

3.3.5
memory token carrier
physical token carrier containing a non-volatile memory device, in which the token is electronically encoded and stored while it is being transported

3.3.6
microprocessor token carrier
physical token carrier containing a microprocessor device with non-volatile memory, in which the token is electronically encoded and stored while it is being transported

Note 1 to entry: In addition to the token information, the microprocessor token carrier may also contain an application programme and associated data.

3.3.7
numeric token carrier
token transfer method where the token information can be represented in a secure manner by a visible and human readable sequence of numeric digits (typically 20 digits printed on a receipt)

Note 1 to entry: They may be entered into a payment meter via a keypad interface for evaluation and action.

3.3.8
one-way token carrier
physical or virtual token carrier which is used for the transfer of credit and possibly tariff and configuration data in a single direction from the vending point or the management system to the payment meter

3.3.9
physical token carrier
token carrier that requires a human to transport it at least part of the way between the point where the token is loaded onto the token carrier and the point where it is retrieved from the token carrier by the payment meter

Note 1 to entry: Examples of physical token carriers are: printed numbers; magnetic cards; printed bar codes; electronic storage in memory devices such as smart cards or memory keys; and audio messages dictated by interactive voice response equipment.