IEC 62057-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electrical energy meters – Test equipment, techniques and procedures – Part 3: Automatic meter testing system (AMTS)

Compteurs d'énergie électrique – Équipement, techniques et procédures d'essai – Partie 3: Système d'essai automatisé des compteurs d'énergie électrique (AMTS)

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CONTENTS

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ELECTRICAL ENERGY METERS – TEST EQUIPMENT, TECHNIQUES AND PROCEDURES –

Part 3: Automatic meter testing system (AMTS)

FOREWORD

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

Draft	Report on voting
13/1916/FDIS	13/1919/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/publications.

A list of all parts in the IEC 62057 series, published under the general title *Electrical energy meters – Test equipment, techniques and procedures*, 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- withdrawn, or
- revised.

INTRODUCTION

This document aims to define the basic performance requirements for AMTS, while the construction mode and the technical details depend on agreement between manufacturers and users, so as not to limit or inhibit innovation and technological advancement;

This document refers to the existing standards to the maximum extent so that the consistency in the IEC community can be ensured.

ELECTRICAL ENERGY METERS – TEST EQUIPMENT, TECHNIQUES AND PROCEDURES –

Part 3: Automatic meter testing system (AMTS)

1 Scope

This part of IEC 62057 applies to an automatic meter testing system (AMTS) permanently installed in a controlled environment. It covers the functions, technical requirements and acceptance methods of an AMTS. It also applies to a newly manufactured AMTS to test static active or reactive energy meters on 50 Hz or 60 Hz networks with an AC voltage up to 600 V (phase to neutral).

NOTE The controlled environment refers to places that meet the test requirements of meters.

This document defines the kind of AMTS that can continuously and automatically carry out all the test items specified in IEC 62058-31, including visual inspection, AC voltage test, no-load condition, starting current, accuracy and meter constant test.

This document does not apply to:

- data interfaces to the meter and test procedures of data interface;
- industrial controllers, industrial personal computers, and servers supplied along with the AMTS.

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 60204-1:2016, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*
IEC 60204-1:2016/AMD1:2021

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*
IEC 61010-1:2010/AMD1:2016

IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

IEC 61326-1:2020, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

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

IEC 62053-23:2020, *Electricity metering equipment) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)*

IEC 62053-24:2020, *Electricity metering equipment – Particular requirements – Part 24: Static meters for fundamental component reactive energy (classes 0,5S, 1S, 1, 2 and 3)*

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 62057-1:2023, E*lectrical energy meters – Test equipment, techniques and procedures – Part 1: Stationary meter test units (MTUs)*

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 following terms and definitions apply.

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
device under test
DUT
meter intended to measure active/reactive/apparent energy by integrating active/reactive/apparent power with respect to time

Note 1 to entry: For the definition of various types of energy meters and their elements, see IEC 62052-11, IEC 62053-21, IEC 62053-22, IEC 62053-23, and IEC 62053-24.

[SOURCE: IEC 62057-1:2023, 3.1.1, modified – in the definition the term “active and/or reactive” has been replaced with “active/reactive/apparent”.]

3.2
meter test unit
MTU
assembly of sources, frequency generator, reference or working standard, and error calculation and indication system to supply the required test values to the DUT(s) and to measure, calculate and display the error of the DUT(s)

[SOURCE: IEC 62057-1:2023, 3.1.2, modified – in the definition “signals” has been replaced with “values”.]

3.3
automatic meter testing unit
AMTU
MTU which conducts, controls and monitors the desired function(s) or activity(ies) of meter testing through computer controlled software

[SOURCE: IEC 62057-1:2023, 3.1.3]

3.4
automatic meter testing system
AMTS
test system which consists of visual inspection unit(s), AC voltage test unit(s), AMTU(s), and connecting and disconnecting unit(s), and continuously conducts preset DUT test items and activities under computer controlled software without human intervention

3.5
connection and disconnection
process of electrical contact and separation between meter terminals and test equipment in automatic manner

4 General

An AMTS has the basic functions of visual inspection, AC voltage test, accuracy test, ability to move meters from one location to another, and connecting and disconnecting.

All test items specified in IEC 62058-31:2008, Clause 5, can be carried out by an AMTS continuously and automatically, and all the information during the tests can be recorded.

The tests shall be carried out in accordance with the sequence defined in of IEC 62058-31:2008, Table 4.

Measures shall be taken by the AMTS to deal with those DUTs detected as unqualified during the test. No further tests shall be performed on unqualified DUTs.

When an abnormality occurs, the AMTS shall recover to its normal operation promptly.

To ensure the accuracy of test results, electromagnetic isolation measures such as sufficient space or electromagnetic shielding should be taken between each test position.

The essential health and safety requirements relating to the design of the AMTS can be subject to relevant laws and regulations.

5 Functional requirements

5.1 Visual inspection of DUTs

The AMTS shall automatically identify the DUTs' marks and appearances and give results in accordance with the requirements of IEC 62058-31:2008, 5.2.

5.2 AC voltage test of DUTs

The AMTS shall automatically carry out the AC voltage test on DUTs in accordance with IEC 62052-31:2015, 6.10.4.3.4.

The requirements of an AC voltage generator shall be in accordance with IEC 61180:2016, Clause 6.

During the tests, in case the leakage current of the DUT at a test position reaches the limits of the tripping current, the test voltage at that position shall be automatically and promptly cut off, without disrupting the tests at other positions.

5.3 Accuracy test of DUTs

The requirements, test conditions, and procedures of IEC 62057-1 apply.

The tests of no-load condition, starting current, accuracy and meter constant shall be carried out automatically in accordance with the requirements of IEC 62053-21:2020, Clause 7, for static meters for AC active energy (classes 0,5, 1 and 2), IEC 62053-22:2020, Clause 7, for static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S), IEC 62053-23:2020, Clause 7, for static meters for reactive energy (classes 2 and 3) or IEC 62053-24:2020, Clause 7, for static meters for fundamental component reactive energy classes (0,5 S, 1 S, 1, 2 and 3).

The AMTS shall be able to detect the condition of the broken circuit occurring at a test position, and then short that circuit and mark the condition.

For the DUTs with time switches, the time-keeping accuracy test shall be carried out in accordance with IEC 62054-21:2004, 7.5.2.3.

5.4 Connection and disconnection

The voltage terminals, current terminals and auxiliary terminals (if any) of the DUTs shall be automatically and reliably connected to the corresponding terminals of test positions, and the connecting reliability shall be monitored in a timely way.

Measuring temperature, measuring impedance or mechanical means for monitoring of connecting reliability can be used for the purpose of monitoring.

All current terminals shall be able to carry the maximum test currents continuously, without forced cooling under the operating conditions specified.

The voltage terminals, current terminals and auxiliary terminals (if any) of the DUTs shall be automatically and reliably disconnected from the corresponding terminals of test positions, and the disconnecting reliability shall be monitored in a timely way.

6 Standard electrical values

6.1 Mains supply

The requirements of IEC 62057-1:2023, 6.1, apply.

6.2 Visual inspection unit

The main power supply to the DUTs, if necessary, shall be provided, and the values of voltage and frequency shall match with those of the DUTs.

6.3 AC voltage test unit

At each test position, the output of the AC voltage test unit shall meet the requirements of IEC 62052-31:2015, 6.10.2.5 and 6.10.4.3.4.

6.4 AMTU

The requirements of IEC 62057-1:2023, Clause 6 apply.