

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electricity metering (AC) – Tariff and load control –
Part 21: Particular requirements for time switches**

**Équipement de comptage d'électricité (C.A.) – Tarification et contrôle
de charge –
Partie 21: Exigences particulières pour les horloges de tarification**

[IEC 62054-21:2004](https://standards.iteh.ai/catalog/standards/iec/c09c1cf3-aa2b-4dd2-8516-2317d3404679/iec-62054-21-2004)

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
INTRODUCTION TO AMENDMENT 1	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Standard electrical values	7
5 Mechanical requirements and tests	7
5.1 Dials.....	7
5.2 Digital display.....	7
6 Climatic conditions, requirements and tests	7
7 Electrical requirements and tests.....	7
7.1 Supply voltage.....	7
7.2 Heating	8
7.3 Insulation	9
7.4 Output elements	9
7.5 Functional requirements and tests – accuracy.....	9
7.6 Electromagnetic compatibility (EMC)	12
7.7 Radio interference suppression	15
8 Test conditions and type test.....	15
Annex A (informative) Acceptance tests.....	16

[IEC 62054-21:2004](https://standards.iteh.ai/catalog/standards/iec/c09c1c3-aa2b-4dd2-8516-2317d3404679/iec-62054-21-2004)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING (AC) – TARIFF AND LOAD CONTROL –

Part 21: Particular requirements for time switches

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62054-21 edition 1.1 contains the first edition (2004-05) [documents 13/1308/FDIS and 13/1317/RVD] and its amendment 1 (2017-01) [documents 13/1705A/FDIS and 13/1728/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62054-21 has been prepared by IEC technical committee 13: Equipment for electrical energy measurement and load control.

This standard, in conjunction with IEC 62052-21, cancels and replaces IEC 61038:1990, *Electricity metering – Tariff and load control – Particular requirements for time switches* and all amendments. .

This standard is to be used in conjunction with IEC 62052-21 and the relevant parts of the IEC 62059 series.

The French version of this standard has not been voted upon.

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

IEC 62054 consists of the following parts, under the general title: *Electricity metering (a.c.) Tariff and load control*:

IEC 62054-11: Particular requirements for electronic ripple control receivers
(Replaces the particular requirements of IEC 61037.)

IEC 62054-21: Particular requirements for time switches
(Replaces the particular requirements of IEC 61038.)

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or [IEC 62054-21:2004](#)

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- amended.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 4 years from the date of publication.

The contents of the corrigendum of March 2018 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

~~This standard distinguishes between protective class I and protective class II equipment~~

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

For information, the relevant parts of IEC 62052, IEC 62054 and IEC 62059 are listed below.

IEC 62052-21:2004, *Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 21: Tariff and load control equipment Amendment 1 (2016)*
(Replaces the general requirements of IEC 61037 and IEC 61038.)

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

IEC 62054-11 *Electricity metering (a.c.) – Tariff and load control – Part 11: Particular requirements for electronic ripple control receivers*
(Replaces the particular requirements of IEC 61037.)

IEC 62054-21 *Electricity metering (a.c.) – Tariff and load control – Part 21: Particular requirements for time switches*
(Replaces the particular requirements of IEC 61038.)

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

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

IEC 62059-41 *Electricity metering equipment – Dependability – Part 41: Reliability prediction¹*

INTRODUCTION TO AMENDMENT 1

The purpose of this amendment is to identify and remove all safety related requirements and tests of IEC 62054-21:2004 that are replaced and extended by the complete set of requirements and tests in IEC 62052-31:2015.

¹ To be published.

ELECTRICITY METERING (AC) – TARIFF AND LOAD CONTROL –

Part 21: Particular requirements for time switches

1 Scope

This part of IEC 62054 specifies particular requirements for the type test of newly manufactured indoor time switches with operation reserve that are used to control electrical loads, multi-tariff registers and maximum demand devices of electricity metering equipment.

The time switch keeps the real time, it may keep the date, it may be capable of handling leap years, it may support daylight saving, i.e. it modifies the deviation of local time to GMT according to the relevant regulations. The time switch may have a synchronization capability. The time switch also holds a schedule of switching actions, which may be specified in terms of time, day of the week, date within a month or a year. The time switch controls the output elements depending on the time and the schedule of switching actions stored.

This standard gives no requirements for constructional details internal to the time switch.

In the case where time switch functionality is integrated into multifunction electricity metering equipment, the relevant parts of this standard apply.

This standard covers time switches with analogue mechanical dials or electronic digital displays that are

- synchronous; or
- crystal-controlled.

This standard does not cover the acceptance tests and the conformity tests. Nevertheless, an example of what could be an acceptance test is given in Annex A .

The dependability aspect is covered by the documents of the IEC 62059 series.

The safety aspect is covered by IEC 62052-31:2015.

When using this standard in conjunction with IEC 62052-21, the requirements of this standard take precedence over those of IEC 62052-21 with regard to any item already covered in it.

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 62052-21:2004 *Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 21: Tariff and load control equipment*²
Amendment 1 (2016)

² ~~To be published.~~

3 Terms and definitions

For the purposes of this document, the definitions of IEC 62052-21 apply.

4 Standard electrical values

The values given in IEC 62052-21 apply.

5 Mechanical requirements and tests

The requirements and tests specified in IEC 62052-21 and the following apply.

5.1 Dials

For time switches with analogue mechanical dials:

- the direction of rotation of the dials shall be marked by an arrow;
- the hour dial (if any) shall be capable of being read to the nearest minute;
- when required, the hours on the day dial and the days on the week dial should be marked in a different colour;
- all markings shall be indelible and easy to read.

5.2 Digital display

For time switches with electronic digital display:

- the display shall be easy to read. If the same display is used for displaying different values, then a code or other indication shall be displayed to enable each value to be identified;
- the display time of each displayed value shall be at least 6 s.

6 Climatic conditions, requirements and tests

The conditions, requirements and tests specified in IEC 62052-21 apply.

7 Electrical requirements and tests

7.1 Supply voltage

7.1.1 Supply voltage range

The values specified in IEC 62052-21 apply.

7.1.2 Supply frequency range

IEC 62052-21 applies.

7.1.3 Power consumption

IEC 62052-21 applies.

7.1.4 Voltage dips and short interruptions

See 7.6.8.

7.1.5 Long interruptions of supply voltage

7.1.5.1 Requirements

During an interruption of the supply voltage not exceeding the operation reserve, the time switch shall keep the time within the prescribed accuracy (see 7.5.2).

The output elements shall take up the position determined by the time switch programme within 5 s after the restoration of the nominal supply voltage.

If the length of the interruption of the supply voltage exceeds the operation reserve, the time may need to be re-adjusted. The time switch shall begin to execute the time switch programme within 6 h following the restoration of the supply. However, the user and the supplier may agree that, after a prolonged interruption of the supply voltage, the time switch does not restart, the outputs take up a pre-determined position and the time switch displays a special flag.

7.1.5.2 Test of effect of a long interruption of the supply voltage

For testing the time-keeping accuracy on operation reserve, see 7.5.2.3.

The test of the behaviour of the output elements consists of verifying that, after interrupting the supply voltage for an agreed length of time and when the supply is restored to the time switch, the output elements take up the position as determined by the time-switch programme, according to the indicated time.

This test shall be carried out for all possible positions of the output element(s).

The restoration of the supply voltage shall be made with the switching device free from bounce.

7.1.6 Operation reserve

7.1.6.1 Requirements

IEC 62052-21 applies.

7.1.6.2 Tests

For the test of time-keeping accuracy, see 7.5.2.

For the test of required behaviour of the output elements, see 7.1.5.2.

7.1.7 Life of back-up power supply

IEC 62052-21 applies.

7.1.8 Back-up power supply replacement

IEC 62052-21 applies.

7.2 Heating

IEC 62052-21 applies.

7.3 Insulation

IEC 62052-21 applies.

7.4 Output elements

IEC 62052-21 applies.

7.5 Functional requirements and tests – accuracy

7.5.1 Time setting and programming

7.5.1.1 Time switches with mechanical analogue dials

On a day dial, it shall be possible to set the time with an accuracy better than $\pm 7,5$ min. It shall be possible to programme the switching operations with a resolution of 15 min or smaller and it shall be possible to programme a minimum of two successive switching operations at least within 60 min.

On a week dial, it shall be possible to set the day of the week and the time with an accuracy better than 1 h. It shall be possible to programme the switching operations with a resolution of 2 h or smaller and it shall be possible to programme a minimum of 2 successive switching operations at least within 8 h.

On a year dial, it shall be possible to set the date and time with an accuracy better than 2 days. It shall be possible to programme the switching operations with a resolution of 4 days or smaller and it shall be possible to programme a minimum of 2 successive switching operations at least within 16 days.

7.5.1.2 Time switches with digital displays

It shall be possible to set the date and time (day, month, year, hours and minutes) with an accuracy of 5 s. The setting of the time shall reset the seconds to zero. If setting of the seconds is also available, then the setting of the time shall not reset the seconds to zero, but to the intended value.

NOTE In this case, it is preferable to display also the seconds.

If a daylight saving function is available, the time switch shall display the official time according to the regulations.

It shall be possible to set the switching operations with a resolution of 1 minute, 1 hour, 1 day, 1 month and 1 year.

7.5.2 Time-keeping accuracy

7.5.2.1 Requirements for synchronous time switches

Synchronous time switches shall have a time-keeping accuracy under normal operating conditions better than ± 5 s/30 days assuming that the supply frequency keeps its average on the nominal value.

On operation reserve, at reference temperature, the time-keeping accuracy shall be better than ± 120 s/day, if operation reserve is provided by a spring and better than ± 1 s/day if operation reserve is provided by a supercapacitor, rechargeable battery or primary cell.

7.5.2.2 Requirements for crystal controlled time switches

At reference voltage and reference temperature, crystal-controlled time switches shall have a time-keeping accuracy better than $\pm 0,5$ s/day. The variation of the time-keeping accuracy with the temperature shall be less than ($\pm 0,15$ s/°C/24 h).

On operation reserve, at reference temperature, the time-keeping accuracy shall be better than ± 1 s /day.

NOTE In applications where the time switch is used as part of a system providing time synchronization, the manufacturer and the purchaser may agree on relaxed time-keeping accuracy specifications for the time switch when it is operating in stand-alone mode. In this case, the system time is maintained by the time switch and the synchronization performed at the necessary intervals.

7.5.2.3 Test of time-keeping accuracy

7.5.2.3.1 General test conditions

Place the time switch under test in its normal operating position and, if necessary, in a climatic chamber, and supply it from an apparatus free of voltage dips and short interruptions. Unless otherwise indicated, the reference conditions shown in Annex B of IEC 62052-21 shall be maintained.

NOTE The manufacturer should provide a suitable means for testing the time-keeping accuracy. This could be, for example, an electrical or optical output, or, in the case of capacitor calibrated crystal-controlled time switches, an electromagnetic coupling picking up the signal from the crystal could be used.

7.5.2.3.2 Test of synchronous time switches

7.5.2.3.2.1 Test of synchronous time switches supplied by mains

The time switch under test is supplied together with and synchronised to a reference mains-controlled clock. After a testing period of 30 days, the time indication discrepancy between the reference clock and the time switch under test must be less than ± 5 s.

7.5.2.3.2.2 Test of synchronous time switches on operation reserve

The time switch to be tested is supplied together with, and synchronized to, a reference clock. Before the test, the time switch shall be powered for a suitable length of time, so that the operation reserve is fully available.

NOTE The manufacturer should specify the time necessary for keeping the time switch powered up before the test of operation reserve may commence.

The power supply of the time switch under test is switched off for 36 h. When the power supply is restored, the time-indication discrepancy between the reference clock and the time switch under test shall not be more than that calculated from the time-keeping accuracy on operation reserve multiplied by the length of the operating reserve.

NOTE Consequently, the time indication discrepancy should be less than

- ± 180 s for a spring reserve operated synchronous time switch;
- $\pm 1,5$ s for a battery, a primary cell or a supercapacitor reserve operated synchronous time switch.

The restoration of the voltage shall be made with the switching device free from bounce.

7.5.2.3.3 Test of crystal-controlled time switches

7.5.2.3.3.1 Test of crystal-controlled time switches supplied by mains

The time switch under test is supplied together with, and synchronized to, a reference crystal-controlled clock. After a testing period of 30 days, the time-indication discrepancy between the reference clock and the time switch under test must be less than ± 15 s.