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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Automatic test systems for battery powered emergency escape lighting

Systèmes automatiques d'essai pour éclairage de sécurité sur batteries

IEC 62034:2012

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AUTOMATIC TEST SYSTEMS FOR BATTERY POWERED EMERGENCY ESCAPE LIGHTING

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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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International Standard IEC 62034 has been prepared by subcommittee 34D: Luminaires, of IEC technical committee 34: Lamps and related equipment.

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

FDIS	Report on voting
34D/1040/FDIS	34D/1048/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.

This second edition cancels and replaces the first edition published in 2006. It constitutes a technical revision.

The main changes with respect to the first edition are the improvement of the understanding of the requirements in the various clauses and the compliance requirements listed below and the updating of the normative references.

4.2	Monitoring of the timing circuit
4.3	Functional requirements
4.3.1	The automatic test system (ATS)
4.4.2	Intercommunications failure
4.4.4	Component failures
4.4.7	Software failure
5.1	Functional test
5.2	Duration test
6.2.2	Timing accuracy
6.3.2.2	Testing alternate luminaires
6.3.3.4	Limited duration test
7.1	General

The committee has decided that the contents of this publication 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
- amended.

INTRODUCTION

Emergency lighting systems are a safety related product; their correct performance can only be assured by systematic testing and maintenance. Conventional techniques for testing are reliant upon manual testing procedures, and are highly susceptible to neglect. These limitations of conventional techniques can be overcome by automating the testing process. It is essential that automatic testing systems for emergency luminaires schedule tests reliably, and provide timely notification of failures or degradation of performance.

Automatic test systems (ATS) will still require manual intervention to correct faults when they are identified, and procedures should be put in place for such intervention. These systems provide information to assist users to manage risk on their premises.

Automatic test systems for emergency escape lighting assist the operator of the building by showing the results of tests that will have been made at prescribed intervals, without disrupting any other electrical services. It is essential that the notification of failures or reduction in performance be given at the earliest opportunity to enable the emergency escape system to be restored to full operation.

The automatic test system will provide those responsible for an emergency lighting installation with information to enable them to ensure that the installed luminaires operate correctly when required.

The automatic test system may be part of a building management system (BMS) for making the emergency lighting tests; this standard would only apply to the emergency lighting testing part of a BMS.

A visual check of system components and indicators should be included in the routine of safety staff. This check should be made regularly to ensure that the emergency luminaire is present and intact, with lamps and indicators working and visible i.e. not obscured, covered or painted.

AUTOMATIC TEST SYSTEMS FOR BATTERY POWERED EMERGENCY ESCAPE LIGHTING

1 Scope

This International Standard specifies the basic performance and safety requirements for individual products and components that are incorporated into automatic test systems for use with emergency lighting systems on supply voltages not exceeding 1 000 V.

This standard also specifies the required functionality of a complete automatic test system for an emergency lighting system.

This standard is applicable to testing systems consisting of a number of emergency lighting self-contained luminaires or a central battery with associated emergency lighting luminaires.

NOTE Manual test facilities that rely on manual initiation and/or visual inspection of the lamp condition are outside the scope of 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 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

IEC 60598-1, *Luminaires – Part 1: General requirements and tests*

IEC 60598-2-22, *Luminaires – Part 2-22: Particular requirements – Luminaires for emergency lighting*

IEC 61347-1, *Lamp control gear – Part 1: General and safety requirements*

IEC 61547, *Equipment for general lighting purposes – EMC immunity requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60598-2-22 as well as the following apply.

3.1
automatic test system
ATS
automated test system that may be manually initiated, consisting of parts (such as timers, current detectors, light detectors, changeover switches) which, when connected together, make a system that can carry out the routine testing requirements of emergency lighting luminaires, and indicate the test results

3.2
self-contained luminaires with ATS
emergency luminaire that is self-contained with built-in testing facilities to perform tests and indicate the test results

NOTE Examples of self-contained luminaires are shown in Annex A.

3.3
self-contained luminaire system
system that performs tests on one or more self-contained emergency luminaires, which is connected to a remote panel giving a proper indication of results

NOTE Examples of a self-contained luminaire system are shown in Annex A.

3.4
centrally powered luminaire system
system that performs tests on one or more emergency luminaires, which is connected to a central power supply system or a remote power supply system and giving a proper indication of results

NOTE Examples of a centrally powered luminaire system are shown in Annex A.

3.5
remote panel
part of a system that receives and/or sends information from and/or to the emergency lighting luminaires, and may also indicate the test results

3.6
functional test
test to check the integrity of the circuit and the correct operation of a lamp, a changeover device and battery emergency power supply

3.7
duration test
test to check if the battery emergency power supply source supplies the system within the limits of rated duration of emergency operation

3.8
alternate luminaires
luminaires configured so that tests conducted by the ATS are not made on two adjacent luminaires at the same time

3.9
test facility
main testing and recording device that may consist of a remote panel and/or computerized system, which facilitates and controls the manual and automatic testing and recording of relevant information, and has the ability to indicate test results in a visual and/or printed form

3.10
test sequence
sequence of the test or simulation that the ATS carried out during the test period

3.11
test period
interval of time where the ATS perform the test sequence on the luminaire

3.12
polling rate
rate at which a unit is interrogated by the control system

3.13
changeover device
device which provides a switchover operation of the lamps from normal operation control gear to emergency control gear

4 Requirements

4.1 Safety, construction and installation instructions

All parts of the ATS shall conform to the requirements of IEC 60598-1 and IEC 60598-2-22 where these are appropriate.

NOTE 1 Guidance for the appropriate application of standards for typical systems is provided in Annex A.

The design and construction of the ATS shall ensure that only authorized personnel can change the test duration and the frequency of tests.

The manufacturer shall include installation instructions for the ATS, which shall define any limits of the size and compatibility of the ATS.

In the installation instructions, manufacturers shall advise the type of emergency luminaires for which the ATS is designed.

Compliance is checked by inspection of the manufacturer's instructions and/or of the instruction sheet provided by the manufacturer.

The ATS shall be classified and marked according to one of the type stated in Annex B.

NOTE 2 Test circuit components may be installed within or adjacent to either self-contained or centrally powered luminaires. Additional components may be located in a remote panel.

4.2 Monitoring of the timing circuit

In all ATS types (see Annex B), any failure of the progress of the test sequence of the ATS shall be indicated locally on the luminaire and/or on the remote panel as applicable to the ATS type.

NOTE The monitoring of the timing circuit is essential as the duration of testing periods and the intervals between them need to be ensured and maintained.

This failure shall be tested by simulating a fault that interrupts the progress of the test sequence or any other procedure that can be agreed with the system designer/manufacturer and the test laboratory to demonstrate compliance with this clause, and checking that the failure is indicated locally on the luminaire and/or on the remote panel as applicable to the ATS type.

Compliance is checked by testing a sample according to the instructions provided by the manufacturer.

4.3 Functional requirements

NOTE The tests of 4.3 and 4.4 should be carried out before the tests of Clause 5.

4.3.1 The automatic test system (ATS)

The ATS shall check the functional operation of the emergency lighting luminaires and associated power supplies, at intervals and for the duration specified in Clause 5, to identify any faults that would impair their operational duty. Any faults shall be indicated or reported

within 24 h after their detection. For types P, ER, PER and PERC, verification for a fully loaded system may be made by extrapolation of the polling rate measured on the individual unit.

NOTE Types P, ER, PER and PERC are defined in Annex B.

Compliance is checked by inspection and prescribed test (see Clause 5).

4.3.2 Emergency battery supply

The test system shall check and indicate if the emergency battery supply has failed.

Compliance is checked by disconnecting the battery during the test sequence – a fault shall be indicated within the test period.

4.3.3 Lamps tested in the emergency mode

The test system shall check that any changeover device, where fitted, has powered the lamp from the emergency power supply.

NOTE The full load from the battery is equivalent to the maximum discharge load current of the circuit, excluding the starting period.

Compliance is checked as follows:

- *if the charging current to the battery is higher than 15 % of the full load, the charger shall be disconnected during the test;*
- *if the charging current is between 5 % and 15 % of the full load, the charger shall be compensated during the test;*
- *if the charging current is less than 5 % of the full load, the charger should be ignored during the test.*

4.3.4 Maintained luminaires tested in emergency mode and in normal mains condition

For maintained luminaire that do not have a changeover device, the test system shall check that the lamp operates correctly in both the normal mains supply and failed supply conditions.

For maintained luminaries with a changeover device, test shall be carried out according to 4.3.3 with the monitoring of the battery current or output voltage to check the changeover.

Compliance is checked by inspection of the test system when the maintained lamps are operating.

4.4 System integrity

4.4.1 Protection against system part failures and faults

Any single fault or part-failure that occurs in the ATS, or within one of the system parts, shall not affect the emergency operation of the ATS, in accordance with the requirements of 4.4.2 to 4.4.7.

Compliance is checked by inspection and the requirements of 4.4.2 to 4.4.7.

4.4.2 Intercommunications failure

Any failure of intercommunication between the parts of ATS system, as defined in 3.3 and 3.4, shall not inhibit the emergency operation of the luminaires connected to the ATS, or initiate an unwanted test. Furthermore, in the case P, ER, PER and PERC ATS types (see Annex B), any failure of intercommunication between ATS parts shall be indicated as a fault on the remote panel within 24 h of the failure occurring.

For this test, the communication shall be interrupted by the appropriate means (according to the manufacturer's instructions). The following checks are then made:

– *no unwanted test is initiated;*

– *the emergency operation of the luminaires operates if the normal supply is switched off;*

– *the failure of the interconnection between ATS parts is indicated as a fault on the remote panel within 24 h.*

NOTE Subclauses 22.3.18 and 22.3.21 of IEC 60598-2-22 are to be considered.

4.4.3 System interconnection

The operation of luminaires in the emergency mode shall not be affected by any faults in the wiring of the interconnections of the ATS, including a short circuit, contacts to earth or an interruption in the wiring of the ATS supply or communications wiring. No unwanted test shall be initiated. The test shall only operate at correct times; other tests would put the system's emergency duty at risk.

Compliance is checked by simulation of these wiring faults to the ATS.

NOTE Short circuit connections between supply and communications wiring are not included in the test if they are separated by double insulation.

4.4.4 Component failures

The failure of any single part within the ATS shall not inhibit the emergency operation of more than one of the luminaires connected to the ATS, or initiate an unwanted test.

For component failures that mimic a control signal or inhibit an emergency operation, the requirements of IEC 61347-1 apply.

NOTE For the ATS systems and devices, it may be appropriate to seek the advice of the control gear manufacturers with respect to selection of the internal parts that are most likely to cause a failure against the requirements of this test.

4.4.5 System parts compatibility

The individual parts, control gear and other electronic devices selected to form an ATS shall be proven to be compatible with each other.

It shall be the responsibility of the system designer to ensure ATS component and procedure compatibility. The manufacturer of ATS components/system shall provide details of compatible system components.

The manufacturer shall declare:

– the limits of the installation in the instruction sheet, length of the cabling, quantity of luminaires;

– in the technical folder: the justification of compatibility between any part within the ATS.

NOTE Conformity of individual parts against the requirements of relevant IEC or regional standards cannot be relied on to completely ensure compatibility in this instance. EMC, voltage transfer, switching phenomena, etc. should be considered.

4.4.6 Electromagnetic immunity of the ATS

Electromagnetic phenomena shall not inhibit operation of the ATS or initiate an unwanted test.

Compliance is checked by the tests of IEC 61547 applying the requirements and compliance criteria for emergency lighting luminaires. The IEC 61547 test report shall be provided either by the manufacturer or a third part test house.

In addition, the supply voltage dips and interruptions tests shall be conducted in accordance with IEC 61547. During testing, operation of the ATS shall not be affected, and no unwanted tests shall be initiated.

4.4.7 Software failure

The correct operation of ATS software shall be proven.

It shall be the responsibility of the system designer to conduct sufficient investigations and operational trials to ensure the correct operation of software and failure protection. Detailed software design documentation, for example functional descriptions of the main programme flow, flowcharts for the software operation, fault mode analysis, how the software and hardware interact etc., shall be provided by the designer/manufacturer in order that the test laboratory can ensure the reliability of the software.

Any software failure shall not inhibit the emergency operation of more than one of the luminaires connected to the system, and shall not initiate an unwanted test.

NOTE For product certification (e.g. third party testing), the designer/manufacturer should have available detailed software design documentation, including functional descriptions of the main program flow, including flow charts fault mode analysis, etc. and how the software and hardware interact in order that the test laboratory can ensure the reliability of the software.

Compliance is checked by inspection.

4.5 Test of emergency lamp(s)

The ATS shall check and indicate if the emergency lamp(s) do not operate in emergency mode. In the case of P, ER, PER and PERC ATS types (see Annex B), the indication shall be on the remote panel and possibly on the luminaries.

Compliance is checked by:

a) removal of the emergency incandescent lamp during test; and

b) the fault abnormal conditions of IEC 60598-1 for fluorescent, discharge lamps or any other appropriate emergency lamp technology, e.g. LED.

A fault indication shall be given locally on the luminaire and/or on the remote panel as applicable for a) and b) above.

5 Test duration and interval

5.1 Functional test

A functional test shall be performed at least once a month. For batteries, repeated tests may entail a loss of capacity. For this reason the test duration shall be sufficient to check the illumination of the lamp, but shall not be longer than 10 % of rated duration. For batteries that exhibit loss of capacity from repeated short duration discharges, the total of these test durations shall not exceed 10 % of rated duration in a month. The rated duration is defined in IEC 60598-2-22.

NOTE 1 Attention is drawn to national regulations that may dictate the testing frequency and types of testing required.

NOTE 2 This test gives the earliest warning of luminaire failure that is consistent with luminaire component life. Manual logging of fault conditions, when required, should be actioned within one month or in line with national regulations. Attention is drawn to national regulations that may require other test conditions.

NOTE 3 Proven compatibility of lamps, lamp-control gear, and the automatic test regime is the responsibility of the system provider.

If a mains supply failure occurs before a functional test and within such a time that the battery could not be re-charged sufficiently to run a successful functional test, then the test should be postponed until the battery is recharged sufficiently to perform the test after the restoration of the mains supply up to a period of 24 h. The compatibility of the final ATS parts shall ensure their reliable operation. In the case of P, ER, PER and PERC ATS types (see Annex B) in the event that a functional test is postponed, indication of the pending test shall be given on the remote panel. Where applicable, the test function and test postponement functions are to be demonstrated. If a mains supply failure occurs whilst a functional test is in progress, the test shall be postponed and the system shall enter emergency operation. Following restoration of the mains supply, a postponed functional test shall re-commence automatically as soon as conditions permit. If the duration of the functional test is less than 1 % of the rated duration, then the postponed function is not required.

The conformity of timing requirements including the periodicity and details of the tests (hierarchy, managements of the test delays) is checked by inspection of the manufacturer's declaration and the technical file provided by the manufacturer.

NOTE 4 It is known that non-standardized low-power operation of fluorescent lamps can be damaging to some types/makes of fluorescent lamp.

5.2 Duration test

For full rated duration, a test shall be performed according to the manufacturer's instructions at the commissioning of the ATS, and repeated automatically at least annually.

NOTE 1 The test should check that the emergency lamp(s) are illuminated for their duration of emergency operation for the application or equivalent battery discharge rate.

NOTE 2 Attention is drawn to national regulations that may dictate the testing frequency and types of testing required.

Random automatically-initiated rated duration tests shall be carried out within 52 weeks after commissioning.

NOTE 3 For the use of random initiated ATS, careful consideration may be required for some applications.

The test duration shall not be able to be changed by unauthorized persons.

A duration test shall only be started when the battery supply is fully charged. If a mains supply failure occurs whilst a duration test is in progress, the test shall be postponed and the system shall enter emergency operation. Following restoration of the mains supply, a postponed duration test shall re-commence automatically when the battery supply is fully re-charged.