BS EN 50490:2008

BSI Standards Publication

Electrical installations for lighting and beaconing of aerodromes — Technical requirements for aeronautical ground lighting control and monitoring systems — Units for selective switching and monitoring of individual lamps

National foreword

This British Standard is the UK implementation of EN 50490:2009.

The UK participation in its preparation was entrusted to Technical Committee EPL/97, Aeronautical ground lighting.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 59967 5

ICS 93.120

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2009

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50490

August 2008

ICS 93.120

English version

Electrical installations for lighting and beaconing of aerodromes - Technical requirements for aeronautical ground lighting control and monitoring systems - Units for selective switching and monitoring of individual lamps

Installations électriques pour l'éclairage et le balisage des aérodromes - Exigences techniques pour les systèmes de contrôle et de commande du balisage aéronautique au sol - Unités pour la commutation sélective et le contrôle de lampes individuelles

Elektrische Anlagen für Beleuchtung und Befeuerung von Flugplätzen - Technische Anforderungen für Steuer- und Überwachungssysteme von Flugplatzbefeuerungsanlagen - Geräte für selektives Schalten und Überwachen individueller Feuer

This European Standard was approved by CENELEC on 2008-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 50490:2008 E

Foreword

This European Standard was prepared by Working Group 1 of the Technical Committee CENELEC TC 97, Electrical installations for lighting and beaconing of aerodromes.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50490 on 2008-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2009-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-04-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2004/108/EC. See Annex ZZ.

_____

Contents

Introduction

Aeronautical Ground Lighting (AGL) at an aerodrome provides the pilots of aircraft and drivers of vehicles moving on the aerodrome surface, with guidance information. Selective switching and individual lamp monitoring is one way of controlling the AGL to achieve this.

1 Scope

This European Standard is intended to give general minimum frame requirements for units that are independent of the technology used for switching and/or monitoring of individual or group of lamps in an AGL series circuit.

This European Standard

- applies to the units that are directly electrically connected to the primary or secondary side of an AGL series circuit and are needed to provide the selective switching and/or monitoring of lamps,
- does not cover communication protocols and application procedures,
- does not treat system aspects that influence the AGL operation.

NOTE These units may be used forming part of either a SMGCS or A-SMGCS to guide and/or control the surface movement of aircraft by means of visual aids.

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.

EN 60439-1, *Low voltage switchgear and control gear assemblies ± Part 1: Type tested and partially type-tested assemblies* (IEC 60439-1)

EN 60529, *Degrees of protection provided by enclosures (IP Code)* (IEC 60529)

EN 61000-4-5, *Electromagnetic compatibility (EMC) ± Part 4-5: Testing and measurement techniques - Surge Immunity test* (IEC 61000-4-5)

EN 61000-6-2, *Electromagnetic compatibility (EMC) ± Part 6-2: Generic standards - Immunity for industrial environments* (IEC 61000-6-2)

EN 61000-6-3, *Electromagnetic compatibility (EMC) ± Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments* (IEC 61000-6-3)

EN 61000-6-4, *Electromagnetic compatibility (EMC) ± Part 6-4: Generic standards - Emission standard for industrial environments* (IEC 61000-6-4)

EN 61822, *Electrical installations for lighting and beaconing of aerodromes - Constant current regulators* (IEC 61822)

EN 61823, *Electrical installations for lighting and beaconing of aerodromes - AGL series transformers* (IEC 61823, mod.)

EN 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK-Code)* (IEC 62262)

IEC/TS 61000-6-5, *Electromagnetic compatibility (EMC) ± Part 6-5: Generic standards - Immunity for power station and substation environments*

3 Definitions

For the purposes of this standard the following definitions apply.

Where the terms voltage and current are used, they shall be r.m.s. values unless otherwise stated.

3.1
lamp
light emitting device

3.2
routine test
test for the purpose of checking manufactured products for compliance with this standard

3.3
service voltage
the nominal voltage at which a unit is designed to operate

3.4
type test
test to confirm that the product design and production processes are capable of providing products that meet the requirements of this standard

3.5
type test sample
a sample consisting of one or more similar samples used for a type test

3.6
EUT
Equipment or Unit under Test

3.7
selective switching
switching of an individual lamp or an individual group of lamps

3.8
unit
complete physical assembly capable of performing functions

3.9
function
a task performed by a component or a unit

3.10
component
physical part of a unit

3.11
communication
transmission and receipt of data using an established protocol

4 General requirements

4.1 Electrical connections

Where a unit is provided with leads and/or connectors for connection to the primary or secondary side of an AGL series circuit these shall comply, where applicable, with the requirements of EN 61823 stated below:

- mechanical characteristics of connectors;
- electrical characteristics of the leads and connectors;
- mechanical strength of the interface of all leads with the unit, where the unit is intended to be handled in the same way as a series circuit transformer.

4.2 Enclosure for indoor units

Units, intended for indoor use, shall provide protection at least according to IP 20 (EN 60529).

4.3 Enclosure for outdoor units

Units, intended for outdoor use, shall provide protection at least according to IP 68 (EN 60529). In case the unit is intended for connection only to the secondary and only for installation above ground, the IP-rating can be reduced to IP 54 (EN 60529). The housing material shall comply with the applicable requirements of EN 61823.

4.4 Mechanical impact protection

The protection degree against external mechanical impacts (code IK EN 62262) shall be announced by the manufacturer in the product data sheet.

4.5 Earthing

Any exposed conductive part of the housing shall be provided with an external earthing terminal to enable independent safety earth connection.

4.6 Service temperature and humidity

For outdoor units the ambient temperature range shall be at least – 25 °C to + 55 °C. For indoor units the ambient temperature range shall be at least 0 °C to + 50 °C. The range for relative humidity shall be from 10 % to 95 % non-condensing. Where higher humidity rating is required or where condensing can be expected, the unit shall be designed as intended for underground use. See 4.3.

4.7 Reliability

The MTBF of the unit shall be published in the manufacturer’s technical data.

4.8 Electrical characteristics

4.8.1 Current range

The unit shall operate in the current range corresponding to the provisions contained in EN 61822 and EN 61823.

4.8.2 Voltage range

The unit shall operate in the voltage range corresponding to the provisions contained in EN 61822.

4.8.3 Protection level

Where a unit, intended to be connected to a series circuit (directly or indirectly via a series circuit transformer), provides an electrical connection to an external low voltage system, the unit shall be designed such that this external system is protected against the maximum voltage of the series circuit as specified in EN 61822 for the maximum rated CCR.

4.8.4 Load range

The maximum and minimum loads and the types of loads to be connected to the unit shall be published in the manufacturer's technical data.

4.8.5 Power consumption

The active and reactive power consumption of the unit at each operating mode shall be published in the manufacturer's technical data.

4.8.6 Current reduction

The unit shall not reduce the current available to the lamp by more than 10 mA when the lamp is illuminated regardless of the selected brightness step on the CCR.

NOTE 10 mA is considered to have an insignificant effect on the light output of the lamp.

4.8.7 Electromagnetic compatibility (EMC)

4.8.7.1 Limits for emission

The units shall comply with EN 61000-6-3, excluding EN 61000-3-2 / EN 61000-3-12 and EN 61000-3-3 / EN 61000-3-11.

4.8.7.2 Limits for immunity

The units shall comply to the generic immunity standards for industrial environments EN 61000-6-2. For indoor equipment this shall be supplemented by applicable parts of IEC/TS 61000-6-5 containing EMC immunity requirements for power station and substation environments (locations where apparatus for Electricity Utilities are installed). The units shall comply with requirements for apparatus installed in location type G (power stations and medium voltage substations) as defined in IEC/TS 61000-6-5.

Units shall be designed to withstand voltage and current surges according to IEC 61000-4-5, Class 4.

If a temporary functional degradation occurs during the surge test, it may not last longer than for a period of 10 s.

4.9 Marking

Every unit shall be permanently marked with at least the following information:

- manufacturer name;
- product name;
- version identification;
- identification of the individual unit.

5 Functional requirements

5.1 Switching

5.1.1 General

The functional requirement is to switch a lamp or a group of lamps on and off.

5.1.2 Power-up state

The “power-up mode” defines to which status the switching device should switch the commanded lamp(s) directly after power-up of the series circuit. The choice of power-up modes shall at least include ON and OFF.

5.1.3 Power interruption

Where there is a power interruption of less than 1 s in the main power supply of the AGL circuit or, in the case of separate power supply of the units, in the units power supply, this power interruption shall not cause a change in the lamp status (i.e. ON or OFF).

5.1.4 Safe status

If the control signal is lost for a predefined time, the switching component shall automatically adopt a predefined fail-safe state. The choice of fail-safe state shall at least include ON and OFF.

This predefined time shall be published in the manufacturer’s data sheet.

The fail safe status shall not be activated during a short power interruption as defined in 5.1.3.

5.2 Monitoring

The monitoring function shall provide the following information about the status of the load:

- energized;
- de-energized;
- failed.

The failure modes detected shall be published in the manufacturer’s data sheet.

6 Type and routine tests

6.1 General

The unit shall pass the following tests:

Table 1 - Type and routine tests

Sequence	Test	Type test	Routine test	Reference
1	Visual inspection	Yes	Yes	7.1
2	Functional test	Yes		7.7
3	Mechanical test	Yes		7.2
4	Environmental test	Yes		7.3
5	Ingress protection test	Yes		7.9
6	Electrical test	Yes		7.4
7	EMC test	Yes		7.6
8	Interface voltage protection level test	Yes		7.5
9	Operational test		Yes	7.8

The results of the tests shall be recorded.

6.2 Type tests

The purpose of the type tests is to confirm that the product design and production processes are able to provide products that conform to the requirements of this standard.

The tests shall be done on the same unit, in the sequence specified in Table 1.

The type test shall consider all functional modes, available for the product.

A new type test is required after any design change that may affect the electrical or mechanical characteristics. The re-test can be restricted to the related type tests.

6.3 Routine tests

All units shall undergo the routine test, as defined in Table 1.

Any unit that fails in any of the tests shall be discarded.

7 Test descriptions

All tests shall be done with equipment calibrated to an accuracy class corresponding to or better than the parameter under test.

7.1 Visual inspection

The unit shall be checked for

- correct marking,
- general aspects, such as dimensions, damage and poor workmanship.

7.2 Mechanical test

7.2.1 Impact test

The units shall be tested according to the announced IK-code as specified in EN 62262.

7.2.2 Lead rigidity test

The test shall be performed as specified in EN 61823.

7.3 Environmental tests

7.3.1 Temperature test

The unit shall be introduced, non-energized, into a climatic chamber at the lowest specified service temperature for no less than 4 hours, after temperature stabilization.

Immediately after this phase, the unit shall be exposed to the functional test, as specified in 7.7, under this ambient temperature.

The same steps shall be repeated at the highest specified service temperature, but with the unit energized from the beginning, in the most power dissipating conditions.

7.3.2 IP test

The unit shall be tested as specified in EN 60529.

7.4 Electrical test

7.4.1 r.m.s. current test

Connect the unit to a series circuit. A functional test shall be made at the current range from 6,6 A down to the minimum current at which the unit is intended to operate. The range shall consider the tolerances of the CCR and the series circuit transformer.

Increase the current to 8,5 A for 300 ms. Then make a functional test at 6,6 A for all load types for which the unit is designed.

7.4.2 Current reduction test

The unit shall be connected to a current source, supplying a sine wave and operating in ON mode. The difference between the input and the output current of the unit shall be measured at an operating current of 6,6 A for each type of load the unit is intended to work with.

7.4.3 Dielectric test

Where an earthing terminal is provided the unit shall be subjected to an insulation resistance test according to EN 60439-1 at the service voltage.

7.5 Protection level test

The protection level shall be tested as follows:

a) between the terminals of power voltage level and earth in accordance with 8.2.3.1a) and 8.3.2.1 of EN 60439-1,with the test voltage being twice the rated insulation voltage plus 2 500 V r.m.s., with the rated insulation voltage being 1,1 times the maximum operating voltage. During this test the connection terminals to the low voltage system and all exposed conductive parts shall be earthed;

b) low voltage terminals and earth (output and control terminals being earthed) in accordance with 8.2.3.1a) and 8.3.2.1 of EN 60439-1.

7.6 EMC emission and immunity test

The unit shall be tested for all load types for which the unit is designed in accordance with the requirements specified in 4.8.7.

7.7 Functional test

The functional test is intended to confirm that the unit is capable of performing all functions it is designed for.

All functions of the unit shall be tested at the maximum and the minimum current and load and with all types of load for which the unit is intended to be used.

All characteristics of the unit, specified in the manufacturer's published data, shall be verified.

7.8 Operational test

The operational test is intended to be a subset of the functional test and is intended to check that the manufacturing process has been successful.

A test shall be carried out of the basic functions of the unit at a nominal current and nominal load. Where the unit is intended to switch it must turn the load on and off. Where the unit is intended to monitor it must detect whether the load is on, off or failed. Where the unit is intended to communicate, it shall communicate.

7.9 Ingress protection test

The unit shall be tested in accordance with its required IP rating.

Immediately after the test an operational test shall be performed and (where appropriate) a dielectric test.

Annex ZZ
(informative)

Coverage of Essential Requirements of EC Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in Article 1 of Annex I of the EC Directive 2004/108/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

Bibliography

The following publications are not specifically mentioned in the text, but are companion standards concerning Aeronautical Ground Lighting, and are listed here for convenience.

International Civil Aviation Organisation (ICAO) requirements are published as annexes to the Convention on International Civil Aviation (Chicago 1944) to which signatory Nations apply to the Air Traffic and Navigation Services within their airspace and aerodromes. The annexes contain International Standards and Recommended Practices (SARPs), otherwise known as operational requirements, for the safety, regularity or efficiency of international air navigation. Annex 14 (Volumes I and II) to the Convention contains the AGL requirements for aerodrome design and operations and heliports. These annexes are important documents, which were taken into account while developing this standard. For the purpose of this European Standard, they can be considered as informative references to be looked through only to deepen the matter, but they are not strictly necessary to comply with the present standard. The following annexes are quoted:

ICAO Annex 14, *Aerodromes, Volume I: Aerodrome Design and Operations*

ICAO Annex 14, *Aerodromes, Volume II: Heliports*

EN 60085, *Electrical insulation - Thermal evaluation and designation* (IEC 60085)

EN 61000-4-4, *Electromagnetic compatibility (EMC) ± Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test* (IEC 61000-4-4)

EN 61000-4-6, *Electromagnetic compatibility (EMC) ± Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields* (IEC 61000-4-6)

EN 61000-4-11, *Electromagnetic compatibility (EMC) ± Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests* (IEC 61000-4-11)

IEC/TS 62143, *Electrical installations for lighting and beaconing of aerodromes - Aeronautical ground lighting systems - Guidelines for the development of a safety lifecycle methodology*

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™