

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Electrical installations for lighting and beaconing of aerodromes – Safety
secondary circuits in series circuits – General safety requirements**

**Installations électriques pour l'éclairage et le balisage des aéroports –
Circuits secondaires de sécurité dans des circuits série – Exigences générales
de sécurité**



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.140.50; 93.120

ISBN 978-2-8322-2896-8

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Requirements for the SELV/PELV supply.....	9
4.1 General.....	9
4.2 SELV/PELV-safety demarcation line in an AGL series circuit	10
4.3 Environmental conditions	11
4.4 Degree of protection provided by enclosures	11
4.5 Electromagnetic compatibility (EMC).....	11
4.5.1 Limits of electromagnetic emission	11
4.5.2 Limits of immunity.....	12
4.6 Marking.....	12
4.6.1 Marking of the SELV/PELV power supply.....	12
4.6.2 Marking at the installation locations	12
4.7 Protection against electric shock.....	12
4.7.1 Basic requirements	12
4.7.2 Protective measure to be applied.....	12
4.7.3 Protective separation from the primary series circuit.....	13
4.7.4 Assemblies in the SELV/PELV supply.....	13
4.7.5 Load of the SELV/PELV supply.....	13
4.8 Interfaces.....	14
4.8.1 Supply unit	14
4.8.2 Connectors	14
5 Testing	14
5.1 Type tests	14
5.2 Routine tests.....	14
Annex A (informative) System design selection.....	15
Bibliography.....	16
Figure 1 – Safety demarcation line in a SELV system	10
Figure 2 – Safety demarcation line in a PELV system	11
Table A.1 – Comparison of characteristics of PELV and SELV	15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL INSTALLATIONS FOR
LIGHTING AND BEACONING OF AERODROMES –
SAFETY SECONDARY CIRCUITS IN SERIES CIRCUITS –
GENERAL SAFETY REQUIREMENTS**

FOREWORD

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International Standard IEC 62870 has been prepared by IEC technical committee 97: Electrical installations for lighting and beaconing of aerodromes.

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

FDIS	Report on voting
97/167/FDIS	97/169/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.

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

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INTRODUCTION

With a few exceptions, aeronautical ground lighting is designed for series circuit technology operating with a constant current and a maximum input voltage of 5 000 V a.c. rms, including tolerances. The input voltage to the series circuit is constantly adjusted by the constant current regulator to maintain the series circuit current irrespective of the variations in the load. The properties and characteristics of the constant current regulators are provided in IEC 61822. Due to the structure of the series circuit, i.e. a series connection of all loads, the usual protective devices for personnel protection of an IT, TT or TN network cannot be applied.

Aeronautical ground lighting is defined as any light provided as an aid to air navigation and as such is subject to specific requirements with respect to its resilience, availability, and serviceability levels. Therefore, insulation faults in the series circuit are often tolerated, and do not lead to the automatic disconnection of the electrical supply to the series circuit.

In view of the above IEC 61821 states that no work of any kind is normally permitted on live series circuits without first conducting a suitable and sufficient Risk Assessment and using appropriate protective equipment according to IEC 61821.

The electrical characteristics of the constant current series circuits are often confused with those of IT, TT or TN networks, i.e. constant input voltage, equipment connected in parallel, and a load-dependent current. In practice, it is not always easy to assign rated voltages correctly to individual components of the series circuit or to determine possible touch voltages. In a constant current series circuits, the rated voltage of the equipment in the series circuit and the maximum touch voltage frequently exceed the normal mains input voltage.

In a series circuit installation the series circuit input voltage is divided in proportion to the internal resistances of the various loads. The rated voltage, i.e. the voltage between the input lines of the equipment, is defined by the series circuit current that flows through the equipment and its input impedance. Since input impedance depends on the equipment design and the series circuit current is constant, the input voltage remains the same for each item of equipment. As a result of the provision of current control in the series circuit the series circuit input voltage is load-dependent and corresponds to the sum of all partial voltages in the series circuit.

This is different to determining the maximum possible touch voltage to earth in a series circuit. Since one or more earth faults, of varying resistance to earth, maybe present, the touch voltage to earth may assume any value up to the maximum series circuit input voltage depending on the location of the earth fault and the equipment installed in the series circuit. Therefore when determining the dielectric strength against earth potential it is usual to take the maximum series circuit input voltage. Such peculiarities of the series circuit have been taken into account in the requirements for lamp systems in this standard.

Since there are only a few effective safety features available for personnel protection in series circuit technology the protective measure “Safety extra low voltage (SELV)” and “Protective extra low voltage (PELV)” is applied in this standard for the supply of lamp systems. This measure is common practice and can resort to the application of well-known and accepted methodology. The introduction of SELV/PELV in this type of application has been made possible by the introduction of new illuminant technology that has lower power requirements and hence requires a lower voltage supply.

NOTE This standard is based on SELV specification according to IEC 60364-4-41 and IEC 61558-1.

ELECTRICAL INSTALLATIONS FOR LIGHTING AND BEACONING OF AERODROMES – SAFETY SECONDARY CIRCUITS IN SERIES CIRCUITS – GENERAL SAFETY REQUIREMENTS

1 Scope

This International Standard specifies protective provisions for the operation of lamp systems powered by series circuits in aeronautical ground lighting.

The protective provisions described here refer only to secondary supply systems for loads that are electrically separated from the series circuit.

This standard specifies the level of SELV, and alternatively PELV, under consideration of additional personnel protection during work on live secondary circuits by electrically skilled persons. This standard also covers the special operational features of aeronautical ground lighting and addresses the level of training and the requirements for maintenance procedures detailed in IEC 61821.

The requirements and tests are intended to set a specification framework for system designers, users, and maintenance personnel to ensure a safe and economic use of electrical systems in installations for the beaconing of aerodromes.

This standard complements existing IEC Airfield-Ground- Lighting (AGL) standards and can be used as a design specification.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60417, *Graphical symbols for use on equipment* (available from: <http://www.graphical-symbols.info/equipment>)

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

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

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

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

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

IEC 61821, *Electrical installations for lighting and beaconing of aerodromes – Maintenance of aeronautical ground lighting constant current series circuits*

IEC 61822, *Electrical installations for lighting and beaconing of aerodromes – Constant current regulators*

IEC 61823, *Electrical installations for lighting and beaconing of aerodromes – AGL series transformers*

CISPR 11, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

assembly

self-contained, closed functional unit forming a lamp system together with other assemblies

3.2

electrical equipment **equipment**

anything used, intended to be used or installed for use, to generate, provide, transmit, transform, rectify, convert, conduct, distributes, control, store, measure or use electrical energy

3.3

basic protection

protection against electric shock under fault-free conditions

3.4

basic insulation

insulation of hazardous live parts providing basic protection

Note 1 to entry: The term “basic insulation” does not include insulation used exclusively for functional purposes.

3.5

electrically skilled person

person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create

[SOURCE: IEC 60050-195:1998, 195-04-01]