

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electrical installations for lighting and beaconing of aerodromes –
Part 1-2: Fundamental principles – Particular requirements for series circuits**

**Installations électriques pour l'éclairage et le balisage dans les aérodromes –
Partie 1-2 : Principes fondamentaux – Exigences particulières relatives aux
circuits série**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications provided, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electrical installations for lighting and beaconing of aerodromes –
Part 1-2: Fundamental principles – Particular requirements for series circuits**

**Installations électriques pour l'éclairage et le balisage dans les aérodromes –
Partie 1-2 : Principes fondamentaux – Exigences particulières relatives aux
circuits série**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.140.50, 93.120

ISBN 978-2-8322-8579-4

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Requirements	9
4.1 General.....	9
4.2 Series circuit power supply	9
4.3 Isolation of field circuit.....	9
4.4 Electrical supply to series circuit power equipment (i.e. CCRs)	11
4.5 Series circuit maximum voltage.....	11
4.6 Overcurrent protection	11
4.7 Open circuit protection.....	11
4.8 System insulation resistance.....	12
4.9 Insulation resistance monitoring.....	12
4.10 Operational insulation resistance value.....	12
4.11 Fault protection.....	12
4.12 Cables	12
4.12.1 General	12
4.12.2 Screened (shielded) cables for the primary circuit.....	12
4.13 Earthing of equipment.....	12
5 Selection and installation of AGL equipment and systems	13
5.1 General.....	13
5.2 Operational conditions	13
5.2.1 Voltage	13
5.2.2 Current	13
5.2.3 Frequency	13
5.2.4 Power	13
5.3 Series circuit communication	13
5.4 Electromagnetic compatibility (EMC).....	13
5.5 Impulse withstand voltage.....	14
5.6 Accessibility.....	14
5.7 Cable, transformer and duct installation	14
5.8 Primary and secondary connecting devices.....	14
5.9 Proximity of cables.....	14
5.10 Labelling.....	15
6 Inspection and testing.....	15
6.1 Initial verification.....	15
6.2 Periodic inspection and testing	15
6.3 Visual inspection.....	16
6.4 Testing	17
6.4.1 General	17
6.4.2 Conductor continuity.....	17
6.4.3 Insulation resistance of field circuit.....	17
6.4.4 SELV and PELV	19
6.4.5 Earth electrode resistance	19

6.4.6	Functional testing	20
6.5	Certification and reporting.....	20
6.6	Records	20
Annex A (informative)	New installation insulation value (under development).....	21
Annex B (informative)	AGL installation certificate.....	23
Annex C (informative)	Schedule of verification	31
Bibliography.....		34
Figure 1 – Field circuit isolator modes of operation		11
Table 1 – Test voltages and insulation resistance values		18
Table A.1 – Theoretical leakage currents in series circuit elements as a function of cable voltage class		21
Table B.1 – AGL installation certificate		23
Table B.2 – AGL periodic inspection and testing report.....		26
Table B.3 – AGL circuit continuity and insulation resistance test results.....		29
Table C.1 – Schedule of verification.....		31

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL INSTALLATIONS FOR LIGHTING
AND BEACONING OF AERODROMES –**

**Part 1-2: Fundamental principles –
Particular requirements for series circuits**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use, and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, accept IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61820-1-2 has been prepared by IEC technical committee 97: Electrical installations for lighting and beaconing of aerodromes. It is an International Standard.

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

Draft	Report on voting
97/267/FDIS	97/268/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 61820 series, published under the general title *Electrical installations for lighting and beaconing of aerodromes*, 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 is a part of the IEC 61820 series that describes the minimum requirements for the lifecycle of an aeronautical ground lighting (AGL) system including design, installation, commissioning, maintenance, decommissioning and disposal.

The series circuit normally operates with a constant current and a load dependent variable voltage. The protective measures for series circuits according to this document are adapted to that supply concept and the extreme long cables in the field. They are based in principle on an IT supply concept (floating and separated from ground) and the protection against direct contact to any live part at least for the primary circuit and safety extra low voltage (SELV) or protective extra low voltage (PELV) power supply feeding the light fixtures or other loads of the series circuit. In recognition of possible aviation hazards, an automatic disconnection of the AGL system in case of an electrical failure is not required in general (see details in IEC 61820-1).

People involved in work on AGL electrical systems are knowledgeable of the specific risks and the safety procedures involved in the work related to the applied system design. It is strongly recommended to do a work safety risk analysis considering all local circumstances to define safe work procedures and training to the personnel. Training regarding the hazards of series circuits should be provided to non-electricians (e.g. grass cutters, snow plow operators, etc.)

NOTE 1 For specifications on SELV/PELV power supplies for AGL systems, see IEC 61820-3-4.

NOTE 2 Local/national regulations can be different to these standard provisions.

NOTE 3 In case the power supply is not compliant to SELV or PELV, appropriate measures can be implemented.

NOTE 4 Where the terms "voltage" and "current" are used in this document, they refer to RMS values unless otherwise specified.

ELECTRICAL INSTALLATIONS FOR LIGHTING AND BEACONING OF AERODROMES –

Part 1-2: Fundamental principles – Particular requirements for series circuits

1 Scope

This part of IEC 61820 describes requirements for AGL systems including power supplies, transformation of energy, cables, and any electrical component utilized to produce the light intended to be used as a visual aid for air and ground navigation based on IEC 61820-1, complemented with series circuit specific topics.

2 Normative references

The following documents are referred to in the text in such a way that for 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 60060 (all parts), *High-voltage test techniques*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*

IEC 61557 (all parts), *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC – Equipment for testing, measuring or monitoring of protective measures*

IEC 61820-1:2019, *Electrical installations for aeronautical ground lighting at aerodromes – Part 1: Fundamental principles*

IEC 61820-3-2, *Electrical installations for lighting and beaconing of aerodromes – Part 3-2: Requirements for power supplies – Particular requirements for series circuit*

IEC 61820-3-4, *Electrical installations for lighting and beaconing of aerodromes – Safety secondary circuits in series circuits – General safety requirements*

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

IEC 63067, *Electrical installations for lighting and beaconing of aerodromes – Connecting devices – General requirements and tests*