

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

**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 |

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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.