IEC 60519-12

Edition 2.0 2016-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety in installations for electroheating and electromagnetic processing – Part 12: Particular requirements for infrared electroheating

Sécurité dans les installations destinées au traitement électrothermique et électromagnétique – Partie 12: Exigences particulières pour chauffage électrique par rayonnement infrarouge

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 25.180.10

ISBN 978-2-8322-3709-0

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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SAFETY IN INSTALLATIONS FOR ELECTROHEATING AND ELECTROMAGNETIC PROCESSING –

Part 12: Particular requirements for infrared electroheating

FOREWORD

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International Standard IEC 60519-12 has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing.

This second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the structure has been redrafted according to IEC 60519-1:2015;
b) terms/definitions, normative references and bibliography have been updated and completed;
c) all requirements and content from IEC 60519-12:2013 that have been included in IEC 60519-1:2015 have been removed to avoid any duplication.

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

CDV	Report on voting
27/967/CDV	27/982/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60519 series, published under the general title *Safety in installations for electroheating and electromagnetic processing*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The clauses of parts of the IEC 60519 series (hereinafter called Particular Requirements) supplement or modify the corresponding clauses of IEC 60519-1:2015 (*General Requirements* hereinafter called Part 1).

This part of IEC 60519 is to be read in conjunction with Part 1. It supplements or modifies the corresponding clauses of Part 1. Where the text indicates an "addition" to or a "replacement" of the relevant provision of Part 1, these changes are made to the relevant text of Part 1. Where no change is necessary, the words "This clause of Part 1 is applicable" are used. When a particular subclause of Part 1 is not mentioned in this part, that subclause applies as far as is reasonable.

Additional specific provisions to those in Part 1, given as individual clauses or subclauses, are numbered starting from 101.

NOTE The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

In this standard, the following print types are used:

- requirements and definitions: in roman type;
- NOTES: in smaller roman type;
- terms used throughout this standard which have been defined in Clause 3: **in bold type**.

INTRODUCTION

The scope of this standard covers a broad range of types and designs of infrared equipment which are used for many different purposes. This standard is intended to cover all industrial infrared equipment types, with some few exceptions provided in Clause 1.

Many other types of electroheating equipment emit infrared radiation of hazardous levels, therefore IEC 60519-1:2015 provides all general requirements addressing optical radiation and this document provides specific considerations for infrared equipment and helpful methods.

With reference to IEC 60519-2:2006 it has been agreed in TC 27 that this standard covers all kinds of infrared emission hazards of industrial electroheating installations and provisions not given in IEC 60519-1:2015.

The discussion of infrared radiation assessment has become quite detailed in this standard, as for the industry there is not any single useful source available for simple, versatile, easy to use and cost effective measurement methods.

The other principles for covering the risks caused by infrared radiation were:

- the manufacturer usually does not employ an expert in optical radiation measurement or has access to an optical laboratory with all the necessary equipment needed for elaborate measurements;
- operating staff with limited experience in radiation measurement is usually responsible for the task of performing the necessary measurements and will appreciate a simple and easy to follow guide;
- the scope of IEC 62471:2006 is limited to lamps but is applicable for other light sources. Therefore, core aspects were adapted from that standard and if possible simplified for this document.
- figures illustrating the classes defined in IEC 62471:2006 and listed in IEC 60519-1:2015 are included;
- relevant documents of American National Standard Institute/Illuminating Engineering Society of North America, the ANSI/IESNA RP 27 series, are based on the ICNIRP recommendations as well. They provide no extra or contradictory material with regard to this standard and its references.

SAFETY IN INSTALLATIONS FOR ELECTROHEATING AND ELECTROMAGNETIC PROCESSING –

Part 12: Particular requirements for infrared electroheating

1 Scope and object

1.1 Scope

This clause of Part 1 is replaced by the following.

Replacement:

This part of IEC 60519 specifies safety requirements for industrial electroheating equipment and installations in which infrared radiation – usually generated by infrared emitters – is significantly dominating over heat convection or heat conduction as means of energy transfer to the workload. A further limitation of the scope is that the infrared emitters have a maximum spectral emission at longer wavelengths than 780 nm in air or vacuum, and are emitting wideband continuous spectra such as by thermal radiation or high pressure arcs.

IEC 60519-1:2015 defines infrared as radiation within the frequency range between 400 THz and 300 GHz. This corresponds to a wavelength range between 780 nm and 10 μm in vacuum. Industrial infrared heating commonly uses thermal infrared sources with rated temperatures between 500 °C and 3 000 °C; the emitted radiation from these sources dominates in the wavelength range between 780 nm and 10 μm.

Since substantial emission of thermal emitters can extend either to wavelengths below 780 nm or above 3 000 nm, the safety aspects of emitted visible light and emission at wavelengths longer than 3 000 nm are also considered in this document.

This standard is not applicable to

- infrared installations with lasers or light-emitting diodes (LEDs) as main sources – they are covered by IEC 62471:2006 and IEC 60825-1:2014;
- appliances for use by the general public;
- appliances for laboratory use – they are covered by IEC 61010-1:2010;
- electroheating installations where resistance heated bare wires, tubes or bars are used as heating elements, and infrared radiation is not a dominant side effect of the intended use, covered by IEC 60519-2:2006;
- infrared heating equipment with a nominal combined electrical power of the infrared emitters of less than 250 W;
- handheld infrared equipment.

Industrial infrared electroheating equipment under the scope of this standard typically uses the Joule effect for the conversion of electric energy into infrared radiation by one or several sources. Radiation is then emitted from one or several elements onto the material to be treated. Such infrared heating elements are in particular:

- thermal infrared emitters in the form of tubular, plate-like or otherwise shaped ceramics with a resistive element inside;
- infrared quartz glass tube or halogen lamp emitters with a hot filament as a source;