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| STN | **Bezpečnosť elektrotepelných zariadení. Časť 12: Osobitné požiadavky na infračervené elektrotepelné zariadenia.** | **STN EN 60519-12**<br><br>33 5002 |
|---|---|---|

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/13

Obsahuje: EN 60519-12:2013, IEC 60519-12:2013

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 60519-12

June 2013

ICS 25.180.10

English version

# Safety in electroheating installations - Part 12: Particular requirements for infrared electroheating installations

(IEC 60519-12:2013)

Sécurité dans les installations électrothermiques - Partie 12 : Exigences particulières pour les équipements de chauffage par rayonnement infrarouge (CEI 60519-12:2013)

Sicherheit in Elektrowärmeanlagen - Teil 12: Besondere Bestimmungen für Infrarot-Elektrowärmeanlagen (IEC 60519-12:2013)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**



Ref. No. EN 60519-12:2013 E

## Foreword

The text of document 27/894/FDIS, future edition 1 of IEC 60519-12, prepared by IEC/TC 27 "Industrial electroheating and electromagnetic processing" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60519-12:2013.

The following dates are fixed:

| | | |
|---|---|---|
| • latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2014-02-20 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2016-05-20 |

The clauses of parts of the EN 60519 series (hereinafter called Particular requirements) supplement or modify the corresponding clauses of EN 60519-1:2011 (*General requirements* hereinafter called Part 1).

This part of EN 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.

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NOTE The following numbering system is used:
– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

## Endorsement notice

The text of the International Standard IEC 60519-12:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|---|---|---|
| IEC 60519-2:2006 | NOTE | Harmonised as EN 60519-2:2006 (not modified). |
| IEC 60825-1:2007 | NOTE | Harmonised as EN 60825-1:2007 (not modified). |
| IEC 61010-1:2010 | NOTE | Harmonised as EN 61010-1:2010 (not modified). |

# Annex ZA
(normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60519-1<br>+ corr. November | 2010<br>2012 | Safety in electroheating installations -<br>Part 1: General requirements | EN 60519-1 | 2011 |
| IEC 62471 (mod) | 2006 | Photobiological safety of lamps and lamp systems | EN 62471 | 2008 |
| ISO 12100 | 2010 | Safety of machinery - General principles for design - Risk assessment and risk reduction | EN ISO 12100 | 2010 |
| ISO 13577-1 | - | Industrial furnaces and associated processing equipment - Safety -<br>Part 1: General requirements | - | - |
| ISO 14159 | - | Safety of machinery - Hygiene requirements for the design of machinery | EN ISO 14159 | - |

IEC 60519-12

Edition 1.0 2013-04

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Safety in electroheating installations – Part 12: Particular requirements for infrared electroheating installations

## Sécurité dans les installations électrothermiques – Partie 12: Exigences particulières pour les installations électrothermiques par rayonnement infrarouge

IEC 60519-12:2013

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IEC 60519-12

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# INTERNATIONAL STANDARD

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## Safety in electroheating installations – Part 12: Particular requirements for infrared electroheating installations

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

# SAFETY IN ELECTROHEATING INSTALLATIONS –

# Part 12: Particular requirements for infrared electroheating installations

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

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

| FDIS | Report on voting |
|---|---|
| 27/894/FDIS | 27/905/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.

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

The clauses of parts of the IEC 60519 series (hereinafter called Particular requirements) supplement or modify the corresponding clauses of IEC 60519-1:2010 (*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.

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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;

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

# INTRODUCTION

The scope of this standard covers very different types and designs of infrared equipment used for many different purposes by the industry. This standard is intended to cover all industrial infrared equipment types, with some few exceptions described in Clause 1.

As many different types of electroheating equipment emit infrared radiation of hazardous levels, the scope of this Part 12 of the IEC 60519 series addresses these infrared radiation aspects for other parts of the series as well. Especially and with reference to IEC 60519-2:2006 [3][1] it has been agreed in TC 27 that this standard covers all kinds of infrared emission hazards of industrial electroheating installations.

The discussion of infrared radiation 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.

Provisions of this standard relating to hazards by infrared emission from the equipment as such and from hot workloads can be used as a complement to IEC 60519-2:2006, since such aspects are not dealt with in that standard.

This standard provides guidance on the assessment and avoidance of hazards caused by infrared radiation emitted to accessible locations by hot workloads, electrodes, or other thermal sources belonging to electroheating equipment.

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

– Neither the manufacturer nor the user of electroheating equipment usually employs 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.
– EN 14255-2:2005 is defined for and useful for lamps only [8].
– EN 12198 series is not very detailed on measurement methods. It gives good guidance on procedures to improve the safety of equipment. Some material from this source has been adapted [9 – 11].
– The scope of IEC 62471:2006 is limited to lamps but that standard can be used for other light sources. Therefore, core aspects were adapted and if possible simplified for this standard. Content that is essential for safety of electroheating equipment is included in this standard.
– Figures illustrating the classes defined in IEC 62471:2006 are included to provide a more understandable and useful standard (IEC 62471:2006 provides data only in the tables).
– Relevant documents of American National Standard Institute / Illuminating Engineering Society of North America, the ANSI/IESNA RP 27 series [12 – 14], are based on the ICNIRP recommendations [1, 2] as well. They provide no extra material with regard to this standard and its references.

A new infrared warning sign shown in Annex GG has been defined in liaison with IEC/SC 3C.

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1 Numbers in square brackets refer to the Bibliography.

# SAFETY IN ELECTROHEATING INSTALLATIONS –

# Part 12: Particular requirements for infrared electroheating installations

## 1 Scope and object

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 material to be treated. 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 60519-1:2010 defines infrared as radiation within the frequency range between about 400 THz and 300 GHz. This corresponds to the wavelength range between 780 nm and 1 mm in vacuum. Industrial infrared heating usually uses 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 e.g. blackbody thermal emitters may extend beyond 780 nm or 3 000 nm, the safety aspects of emitted visible light and emission at wavelengths longer than 3 000 nm are also considered in this standard.

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, IEC 60825-1:2007 [4] and IEC/TR 60825-9:1999 [5];
– appliances for use by the general public;
– appliances for laboratory use – they are covered by IEC 61010-1:2010 [6];
– 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 [3];
– 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;
– non insulated elements made from molybdenum disilicide, silicon carbide, graphite, iron-chromium-aluminium alloys like Kanthal™ or comparable materials;
– wide-spectrum arc lamps.

## 2 Normative references

This clause of Part 1 is applicable except as follows.

*Additions:*

IEC 60519-1:2010, *Safety in electroheating installations – Part 1: General requirements*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

ISO 12100:2010, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

ISO 13577-1, *Industrial furnaces and associated processing equipment – Safety – Part 1: General requirements*

ISO 14159, *Safety of machinery – Hygiene requirements for the design of machinery*