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NSAI Standards

Irish Standard
I.S. EN 62693:2013

Industrial electroheating installations - Test methods for infrared electroheating installations (IEC 62693:2013 (EQV))

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62693

August 2013

ICS 25.180.10

English version

Industrial electroheating installations - Test methods for infrared electroheating installations

(IEC 62693:2013)

Installations électrothermiques industrielles - Méthodes d'essais relatives aux installations électrothermiques par rayonnement infrarouge (CEI 62693:2013)

Industrielle Elektrowärmeanlagen - Prüfverfahren für Infrarot-Elektrowärmeanlagen (IEC 62693:2013)

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European Committee for Electrotechnical Standardization
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Ref. No. EN 62693:2013 E

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Foreword

The text of document 27/877/CDV, future edition 1 of IEC 62693, prepared by IEC/TC 27 "Industrial electroheating and electromagnetic processing" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62693:2013.

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)	2014-04-23
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-07-23

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The text of the International Standard IEC 62693:2013 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 60038	NOTE	Harmonised as EN 60038.
IEC 60398:1999	NOTE	Harmonised as EN 60398:1999.
IEC 60519-2:2006	NOTE	Harmonised as EN 60519-2:2006.
IEC 60825-1:2007	NOTE	Harmonised as EN 60825-1:2007.
IEC 61010-1:2010	NOTE	Harmonised as EN 61010-1:2010.
IEC 62471:2006	NOTE	Harmonised as EN 62471:2008 (modified).
ISO 638:2008	NOTE	Harmonised as EN ISO 638:2008.
ISO 2813:1994	NOTE	Harmonised as EN ISO 2813:1999.
ISO 8254-1:2009	NOTE	Harmonised as EN ISO 8254-1:2009.
ISO 8254-2:2003	NOTE	Harmonised as EN ISO 8254-2:2003.

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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 + corr. November	2010 2012	Safety in electroheating installations - Part 1: General requirements	EN 60519-1	2011
IEC 60519-12	2013	Safety in electroheating installations - Part 12: Particular requirements for infrared electroheating installations	EN 60519-12	2013

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL ELECTROHEATING INSTALLATIONS – TEST METHODS FOR INFRARED ELECTROHEATING INSTALLATIONS

FOREWORD

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International Standard IEC 62693 has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing.

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

CDV	Report on voting
27/877/CDV	27/902/RVC

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.

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INTRODUCTION

This standard on particular test methods for infrared electroheating installations is one of TC 27 standards that describe test methods for various types of electroheating installations.

Test methods for ovens under the scope of IEC 60397 [3][1] are also covered in this standard when infrared radiation is the intended heat transfer in such equipment – this is assumed to be valid above an actual or processing temperature of 700 °C, independently of the rated temperature of the oven.

This standard is solely concerned with tests for infrared equipment and installations. Tests that focus on the performance of infrared emitters will be covered by IEC 62798 [2] [11]. The rationale for this separation is that infrared installations are usually manufactured by other companies than infrared emitters. Still, infrared emitters are a very important and distinct part of infrared installations and a set of tests that allow for proper comparison of different infrared emitters will be valuable to manufacturers of infrared installations.

The major guiding principle in this standard is to define tests that can be performed with the usual test and measuring equipment available to most kinds of companies, large or small.

The tests focus on the performance and efficiency of installations, as these are of major interest for manufacturers and users of such installations. The tests are intended to enable a fair comparison of installations belonging to a given class. The standard includes considerations and tests concerned with energy efficiency, so that the tests can be used for assessment of energy use and for energetic optimisation of installations as well.

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1 Numbers in square brackets refer to the Bibliography.

2 Under consideration.

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INDUSTRIAL ELECTROHEATING INSTALLATIONS – TEST METHODS FOR INFRARED ELECTROHEATING INSTALLATIONS

1 Scope and object

This International Standard specifies test procedures, conditions and methods according to which the main parameters and the main operational characteristics of industrial infrared electroheating installations are established.

A 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.

In industrial infrared electroheating installations, infrared radiation is usually generated by infrared emitters and infrared radiation is significantly dominating over heat convection or heat conduction as means of energy transfer to the workload.

IEC 60519-1:2010 defines infrared as optical 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.

Installations under the scope of this standard typically use the Joule effect for the conversion of electric energy inside one or several sources into infrared radiation emitted onto the workload. Such infrared emitters are especially

- 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 or comparable materials;
- restive metallic heating elements made e.g. from nickel based alloys or iron-chromium-aluminium alloys;
- wide-spectrum arc lamps.

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 [9], IEC 60825-1:2007 [6] and IEC/TR 60825-9:1999 [7];
- appliances for use by the general public;
- appliances for laboratory use – they are covered by IEC 61010-1:2010 [8];
- 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 [5];
- infrared heating equipment with a nominal combined electrical power of the infrared emitters of less than 250 W;
- handheld infrared equipment.

The tests are intended to be used to enable a fair comparison of the performance of installations belonging to the same class.

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Tests related to safety of the installations are defined in IEC 60519-12:2013. Tests related to the performance of infrared electroheating emitters are specified in IEC 62798:— [11].

Therefore, this standard is applicable to ovens and furnaces with resistive heating elements if they fall under the scope of this standard.

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

IEC 60519-12:2013, *Safety in electroheating installations – Part 12: Particular Requirements for infrared electroheating installations*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60519-12:2013 and the following apply.

NOTE General definitions are given in the International Electrotechnical Vocabulary, IEC 60050 [2]. Terms relating to industrial electroheating are defined in IEC 60050-841.

3.1 General

3.1.1
installation class
group within a type of installation, using the same principle for processing the workload and the size of this as well as the production capacity

3.1.2
production capacity
measure of the production rate capability of equipment in normal operation

EXAMPLE Flow, mass or volume.

Note 1 to entry: The capacity does not refer to the volume of the working space.

3.1.3
electroheating efficiency, <of an installation>
ratio of the usable enthalpy increase in the workload to the electric energy supplied to it at the location of the equipment, during a cycle of batch operation or stationary operation during a suitable time period for measurements

[SOURCE IEC 60050-841:2004, 841-22-70, modified – The term itself has been modified and details with respect to the kind of operation have been added.]

3.1.4
electric conversion efficiency
quotient between the available electric active power output for the transfer to the workload, and the electric input active power from the supply network, at power settings for normal operation

Note 1 to entry: The concept does not apply to conversion of electric energy to infrared radiation by heated elements.

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