
High-frequency induction heating installations - Test methods for the determination of power output of the generator

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**High-frequency induction heating installations -
Test methods for the determination
of power output of the generator
(IEC 61922:2002)**

Installations de chauffage
par induction haute fréquence -
Méthodes d'essai pour la détermination
de la puissance de sortie du générateur
(CEI 61922:2002)

Hochfrequenz-
Induktionserwärmungsanlagen -
Prüfverfahren für die Bestimmung
der Ausgangsleistung des Generators
(IEC 61922:2002)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 27/314/FDIS, future edition 1 of IEC 61922, prepared by IEC TC 27, Industrial electroheating equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61922 on 2002-09-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-06-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-09-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annex A is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61922:2002 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-841	- ¹⁾	International Electrotechnical Vocabulary (IEV) Chapter 841: Industrial electroheating	-	-
IEC 60519-1	- ¹⁾	Safety in electroheat installations Part 1: General requirements	EN 60519-1	1993 ²⁾
IEC 60519-3 (mod)	1988	Part 3: Particular requirements for induction and conduction heating and induction melting installations	EN 60519-3	1995
IEC 61308	1994	High-frequency dielectric heating installations - Test methods for the determination of power output	EN 61308	1996
CISPR 11 (mod)	- ¹⁾	Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55011	1998 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

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First edition
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haute fréquence –
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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HIGH-FREQUENCY INDUCTION HEATING INSTALLATIONS –
TEST METHODS FOR THE DETERMINATION
OF POWER OUTPUT OF THE GENERATOR**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61922 has been prepared by IEC technical committee 27: Industrial electroheating equipment.

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

FDIS	Report on voting
27/314/FDIS	27/325/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 3.

Annex A is for information only.

The committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

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

HIGH-FREQUENCY INDUCTION HEATING INSTALLATIONS – TEST METHODS FOR THE DETERMINATION OF POWER OUTPUT OF THE GENERATOR

1 Scope and object

This International Standard is applicable to industrial radio- or high-frequency induction heating installations used for the purpose of thermal applications (e.g. for surface hardening, welding, soldering, melting, forging, zone refining of semiconductors, etc.).

This standard relates to high-frequency induction heating installations in the frequency range up to 300 MHz for power levels of 500 W and above, comprising high-frequency generators and inductors together with necessary mechanical devices for charge handling (e.g. hardening machines).

The main purpose of this standard is to provide the test methods for the determination of output power of industrial high-frequency induction heating power sources.

Loads as described in this standard may be used in compliance assessment of electromagnetic compatibility according to CISPR 11.

This standard relates to generator capacity of operation under continuous rated conditions as specified by the manufacturer.

The methods of measurement of power output of generators operating in pulse mode with short duty cycles (e.g. the adiabatic calorimeter) are under consideration.

Electronic systems of power measurement are commercially available, but care must be taken in their application because accuracy can not be guaranteed, particularly at higher frequencies. These instruments require high current transformers and voltage transformers for the output power measurements and they also are subject to errors at higher frequencies. These methods require expert knowledge for successful application and therefore are not detailed in this standard.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-841, *International Electrotechnical Vocabulary (IEV) – Chapter 841: Industrial electroheating*

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

IEC 60519-3:1988, *Safety in electroheat installations – Part 3: Particular requirements for induction and conduction heating and induction melting installations*

IEC 61308:1994, *High-frequency dielectric heating installations – Test methods for the determination of power output*

CISPR 11, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electro-magnetic disturbance characteristics – Limits and methods of measurement*

3 Definitions

For the purposes of this International Standard, the definitions given in IEC 60050-841, IEC 60519-1 and IEC 60519-3 as well as the following, apply.

3.1

high-frequency output power

power measured at the power output terminals of the generator, feeding to the test load as defined in this standard

NOTE This definition is explained in figure 1. The left side of the drawing contains the generator and is limited by its two output terminals. The load is connected to these terminals. All power that appears outside of the generator case is defined as the output power of the generator. It comprises the power dissipated in the inductor, power leads, calorimeter, etc.

3.2

calorimeter

device for the measurement of high-frequency power, which consists of a part cooled by water, under controlled flow and measured temperature difference between water inlet and outlet temperatures

NOTE This part is made of steel or other conductive material into which high-frequency currents are induced.

3.3

surface power density

quotient of the power and the active surface of the calorimeter

3.4

loop inductor

inductor in the shape of a loop brought close to the load without forming a full circle around it

3.5

test load

equipment consisting of the connection leads, the inductor and the calorimeter. If a resistor without reactive elements is used as a load, an auxiliary resonant circuit is used for the elimination of the harmonic power. If this auxiliary circuit is not part of the generator, the losses in this circuit are measured with the losses in the other parts of the test load

4 Tests loads

There are three different types of output power test loads for use in high-frequency induction heating installations. Only the main ones are outlined. Detailed constructions shall conform to known engineering techniques.