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Industrial microwave heating installations - Test methods for the determination of power output

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Industrial microwave heating installations - Test methods for the determination of power output

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61307:2011. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 61307 has been prepared by IEC technical committee 27: Industrial electroheating and electromagnetic processing. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

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

a) it covers not only the standby and hibernation modes, but also start-up, standby and holding power consumption, as well as other aspects of operation flexibility;
b) more detailed descriptions of the aspects of microwave power, and handling of the A and B types of equipment.

The text of this International Standard is based on the following documents:

Draft	Report on voting
27/1243/FDIS	27/1247/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This document specifies test methods for the determination of ~~the available microwave output power and~~ the efficiency of frequency conversion from the electrical input, and of the available and workload microwave output power in industrial microwave heating installations, as well as operational flexibility.

~~This standard also specifies test methods for assessing the microwave power deposition in the microwave workload – the microwave workload power, in microwave-only installations.~~

This document is in principle applicable to industrial microwave heating equipment and installations in the frequency range from 300 MHz to 300 GHz but focussed on the microwave ISM frequencies below 6 GHz.

This document relates to industrial microwave heating equipment operating ~~under normal load~~ as intended by the manufacturer's specifications for normal operation.

This document does not apply to appliances for household and similar use (covered by IEC 60335-2-25 [1][1]), commercial use (covered by IEC 60335-2-90 [2] and IEC 60335-2-110 [3]) or laboratory use (covered by IEC 61010-2-010 [4]).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-221:1990, *International Electrotechnical Vocabulary – Chapter 221: Magnetic materials and components*~~
~~Amendment 1(1993)~~
~~Amendment 2 (1999)~~
~~Amendment 3 (2007)~~

IEC 60050-841~~:2004~~, *International Electrotechnical Vocabulary (IEV) - Part 841: Industrial electroheat*

~~IEC 60050-726:1982, *International Electrotechnical Vocabulary – Chapter 726: Transmission lines and waveguides*~~

IEC 60519-6, *Safety in ~~electroheat~~ installations for electroheating and electromagnetic processing - Part 6: ~~Specifications for safety in industrial microwave heating equipment~~ Particular requirements for high frequency dielectric and microwave heating and processing equipment*

[1] Numbers in square brackets refer to the Bibliography.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60519-6, IEC 60050-841 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1
microwave heating equipment
assembly of electrical and mechanical devices intended for the transfer of microwave energy to the ~~microwave load~~ workload and comprising, in general, power supplies, microwave generators or microwave generator assemblies with cooling arrangements and circulators if used, microwave applicators or cavities with ventilation arrangements if used, interconnecting cables and waveguides, control circuitry, and means for transporting the ~~microwave load~~ workload if used

~~[IEC 60050-841:2004, 841-29-06, modified]~~

3.2
equipment class
group within a type of equipment, using the same principle for processing of the workload either type A or type B

SEE: Annex A.

Note 1 to entry: An example of type is microwave equipment, and a class example is such equipment for wood drying heating in a specified capacity interval using the ISM frequency 2,45 GHz.

3.3
type A equipment
<microwave> equipment with the microwave generator (frequency converter part) independent of, or separable from, the applicator to which the microwave power is provided

EXAMPLE A coaxial feeder, a waveguide junction.

Note 1 to entry: This allows the integration of a circulator as protection for the magnetron against reflected microwave power as well as a tuner to minimize microwave reflection for proper tuning/matching.

Note 2 to entry: Any ancillary microwave generator components such as cathode heater transformers and the generator cooling system are also separable.

3.4
type B equipment
<microwave> equipment with the microwave generator (frequency converter part) being directly coupled to the applicator, without a transmission line in between

3.5
electrical conversion efficiency of microwave heating equipment
quotient between the available microwave power output and the electrical input to the mains frequency power supply or microwave generator assembly, at power settings for ~~normal~~ intended operation

3.6
overall efficiency
efficiency of the complete system including all ancillary power consumption except for workload transport