



Edition 2.0 2024-07 EXTENDED VERSION

# INTERNATIONAL STANDARD



This extended version of IEC 60335-2-110:2024 includes the content of the references made to IEC 60335-1:2020

Household and similar electrical appliances – Safety – Part 2-110: Particular requirements for commercial microwave appliances with insertion or contacting applicators

### **Document Preview**

EC 60335-2-110:2024





#### THIS PUBLICATION IS COPYRIGHT PROTECTED Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

**IEC** Secretariat 3, rue de Varembé CH-1211 Geneva 20 Switzerland

Tel.: +41 22 919 02 11 info@iec.ch www.iec.ch

#### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

#### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

#### IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.







Edition 2.0 2024-07 EXTENDED VERSION

# INTERNATIONAL STANDARD



This extended version of IEC 60335-2-110:2024 includes the content of the references made to IEC 60335-1:2020

Household and similar electrical appliances – Safety – Part 2-110: Particular requirements for commercial microwave appliances with insertion or contacting applicators

### **Document Preview**

IEC 60335-2-110:2024

https://standards.iteh.ai/catalog/standards/iec/35e1f312-8df5-4032-aae9-1421ee756bda/iec-60335-2-110-2024

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 97.040.20

ISBN 978-2-8322-9411-6

Warning! Make sure that you obtained this publication from an authorized distributor.

#### IEC 60335-1 Edition 6.0 2020-09

#### HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES - SAFETY -

#### Part 1: General requirements

### INTERPRETATION SHEET 1

This interpretation sheet has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances.

The text of this Interpretation Sheet is based on the following documents:

	9
61/5999/DISH 61/6009/RVDISH	h gi

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

#### IEC 60335-2-110:2024

https://standards.iteh.ai/catalog/standards/iec/35e1f312-8df5-4032-aae9-1421ee756bda/iec-60335-2-110-2024

#### INTRODUCTION

Edition 6 of IEC 60335-1:2020 defines and introduces requirements for a detachable power supply part of an appliance. In the document, 24.2 prohibits the use of a power supply in a flexible cord.

#### QUESTION:

Does Subclause 24.2 prohibit the use of a detachable power supply part?

#### ANSWER

No, a "detachable power supply part" is a defined term and is not captured by the term "power supply" as used in Subclause 24.2.

NOTE A detachable power supply part is captured by the defined term when the output of the power supply part is detachable from the class III construction part of the appliance at:

- the power supply part, or

- the class III construction part of the appliance.

However, the supply cord (if any) does not have to be detachable from the detachable power supply part.

## iTeh Standards (https://standards.iteh.ai) Document Preview

<u>IEC 60335-2-110:2024</u> https://standards.iteh.ai/catalog/standards/iec/35e1f312-8df5-4032-aae9-1421ee756bda/iec-60335-2-110-2024

### CONTENTS

FOF	REWORD	6	
INT	RODUCTION to IEC 60335-1:2020	9	
INT	RODUCTION to IEC 60335-2-110:2024	11	
1	Scope	12	
2	Normative references	13	
3	Terms and definitions	18	
4	General requirement	33	
5	General conditions for the tests	33	
6	Classification	37	
7	Marking and instructions	38	
8	Protection against access to live parts	49	
9	Starting of motor-operated appliances	51	
10	Power input and current	52	
11	Heating	54	
12	Charging of metal-ion batteries	60	
13	Leakage current and electric strength at operating temperature	61	
14	Transient overvoltages	64	
15	Moisture resistance	65	
16	Leakage current and electric strength	67	
17	Overload protection of transformers and associated circuits		
18	Endurance	70	
19	Abnormal operation	71	
20	Stability and mechanical hazards	82	
21	Mechanical strength	83	
22	Construction	86	
23	Internal wiring	102	
24	Components	104	
25	Supply connection and external flexible cords	109	
26	Terminals for external conductors	116	
27	Provision for earthing	119	
28	Screws and connections	121	
29	Clearances, creepage distances and solid insulation	124	
30	Resistance to heat and fire	132	
31	Resistance to rusting	137	
32	Radiation, toxicity and similar hazards	137	
101	Protection against accessibility to microwave-containing regions	138	
Ann	ex A (informative) Routine tests	160	
	ex B (normative) Battery-operated appliances, separable batteries and detachable eries for battery-operated appliances	162	
	ex C (normative) Ageing test on motors		
Ann	ex D (normative) Thermal motor protectors	184	
Ann	ex E (normative) Needle-flame test	185	

### IEC 60335-2-110:2024 EXV © IEC 2024 - 3 -

Annex G (normative) Safety isolating transformers	188
Annex H (normative) Switches	189
Annex I (normative) Motors having basic insulation that is inadequate for the rated voltage of the appliance	191
Annex J (normative) Coated printed circuit boards	193
Annex K (informative) Overvoltage categories	194
Annex L (informative) Guidance for the measurement of clearances and creepage distances	195
Annex M (informative) Pollution degree	198
Annex N (normative) Proof tracking test	199
Annex O (informative) Selection and sequence of the tests of Clause 30	200
Annex P (informative) Guidance for the application of this standard to appliances used in tropical climates	205
Annex Q (informative) Sequence of tests for the evaluation of electronic circuits	207
Annex R (normative) Software evaluation	210
Annex S (informative) Guidance for the application of this standard on measurement of power input and current based on the requirements of 10.1 and 10.2 concerning the representative period	224
Annex T (normative) UV-C radiation effect on non-metallic materials	225
Annex U (normative) Appliances intended for remote communication through public networks	228
Annex AA (informative) Rationales for the microwave barrier and associated leakage tests	
Bibliography	238
Index of defined terms	241

Figure 1 – Circuit diagram for leakage current measurement at operating temperature for single-phase connection of class II appliances and for parts of class II construction	
Figure 2 – Circuit diagram for leakage current measurement at operating temperature for single-phase connection of other than class II appliances or parts of class II construction	142
Figure 3 – Circuit diagram for leakage current measurement at operating temperature for three-phase with neutral class II appliances and for parts of class II construction	143
Figure 4 – Circuit diagram for leakage current measurement at operating temperature for three-phase with neutral appliances other than those of class II or parts of class II construction	144
Figure 5 – Small part	145
Figure 6 – Example of an electronic circuit with low-power points	145
Figure 7 – Test finger nail	146
Figure 8 – Flexing test apparatus	147
Figure 9 – Constructions of cord anchorages	148
Figure 10 – An example of parts of an earthing terminal	149
Figure 11 – Examples of clearances	150
Figure 12 – Example of the placement of the cylinder	151
Figure 13 – Small parts cylinder	152
Figure 14 – Example of a specified operating region of a lithium-ion cell during charging	153

Figure 101 – Test rod for interlock concealment	153
Figure 102 – Arrangement for measurement of microwave leakage	154
Figure 103 – Construction site, overview of different applicator types and their use	
Figure 104 – Large area contacting applicator without traction drive	156
Figure 105 – Large area contacting applicator with traction drive	157
Figure 106 – Insertion applicator	158
Figure 107 – Small area contacting applicator	159
Figure B.1 – Examples of battery-operated appliance constructions and application of normative Annex B (1 of 2)	
Figure B.2 – Examples of correct polarity connection marking representing three batteries	182
Figure I.1 – Simulation of faults	
Figure L.1 – Sequence for the determination of clearances	
Figure L.2 – Sequence for the determination of creepage distances	
Figure L.3 – Measurement of clearances	
Figure O.1 – Tests for resistance to heat	
Figure O.2 – Selection and sequence of tests for resistance to fire in hand-held appliances	
Figure O.3 – Selection and sequence of tests for resistance to fire in attended appliances	201
Figure O.4 – Selection and sequence of tests for resistance to fire in unattended appliances	202
Figure O.5 – Some applications of the term "within a distance of 3 mm"	204
Figure Q.1 – Flowchart outlining the sequence of tests for the evaluation of electronic circuits (1 of 2)	208
Figure S.1 – Flowchart giving guidance on measurement of power input and current concerning the representative period	335.22410-20
Table 1 – Power input deviation	52
Table 2 – Current deviation	53
Table 3 – Maximum normal temperature rises	56
Table 4 – Voltage for electric strength test	63
Table 5 – Characteristics of high-voltage sources	64
Table 6 – Impulse test voltage	64
Table 7 – Test voltages	69
Table 8 – Maximum winding temperature	73
Table 9 – Maximum abnormal temperature rise	79
Table 10 – Dimensions of cables and conduits	110
Table 11 – Minimum cross-sectional area of conductors	111
Table 12 – Pull force and torque	114
Table 13 – Nominal cross-sectional area of conductors	118
Table 14 – Torque for testing screws and nuts	122
Table 101 – Assembling torques for screwed connections providing earthing continuity	
Table 15 – Rated impulse voltage	
Table 16 – Minimum clearances	

IEC 60335-2-110:2024 EXV © IEC 2024 - 5 -

Table 17 – Minimum creepage distances for basic insulation1	29
Table 18 – Minimum creepage distances for functional insulation	30
Table 19 – Minimum thickness for accessible parts of reinforced insulation consistingof a single layer1	32
Table 102 – Specifications for microwave barriers      1	40
Table A.1 – Test voltages	61
Table B.1 – Artificial source characteristics	64
Table B.2 – Total area of openings for metal-ion cells1	72
Table B.3 – Volume of air injected at 2 070 kPa1	72
Table C.1 – Test conditions1	83
Table R.1 – General fault/error conditions	212
Table R.2 – Specific fault/error conditions 2	214
Table R.3 – Semi-formal methods	220
Table R.4 – Software architecture specification	220
Table R.5 – Module design specification 2	221
Table R.6 – Design and coding standards 2	222
Table R.7 – Software safety validation 2	222
Table T.1 – Minimum property retention limits after UV-C exposure	226
Table T.2 – Minimum electric strength for internal wiring after UV-C exposure	227
Table U.1 – Examples of acceptable measures against unauthorised access and transmission fault/error modes    2	230

### **Document Preview**

#### IEC 60335-2-110:2024

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

## Part 2-110: Particular requirements for commercial microwave appliances with insertion or contacting applicators

#### 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 Organizations.
- The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- Psi/s6) All users should ensure that they have the latest edition of this publication. 1421ee756bda/iec-60335-2-110-2024
  - 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
  - 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
  - 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

### This extended version (EXV) of the official IEC Standard provides the user with the comprehensive content of the Standard.

IEC 60335-2-110:2024 EXV includes the content of IEC 60335-2-110:2024, and the references made to IEC 60335-1:2020.

The specific content of IEC 60335-2-110:2024 is displayed on a blue background.

IEC 60335-2-110 has been prepared by subcommittee 61B: Safety of microwave appliances for household and commercial use, of IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This second edition cancels and replaces the first edition published in 2013 and Amendment 1:2019. This edition constitutes a technical revision.

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

- Subclause 7.1 has been improved in clarity.
- Subclauses 19.11.2 and 19.103 have been improved in clarity.
- Clause 28 has been modified to add screw requirements.

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

Draft	Report on voting
61B/688/CDV	61B/691A/RVC

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.

A list of all parts of the IEC 60335 series, under the general title: *Household and similar electrical appliances – Safety*, can be found on the IEC website.

os://standards.iteh.ai/catalog/standards/iec/35e1f312-8df5-4032-aae9-1421ee756bda/iec-60335-2-110-2024

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments unless that edition precludes it; in that case, the latest edition that does not preclude it is used. It was established on the basis of the sixth edition (2020) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Particular requirements for commercial microwave appliances with insertion or contacting applicators.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 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.

NOTE 3 The following print types are used:

- requirements: in roman type;
- test specifications: in italic type;
- notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in **bold**.

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.

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations can need a transitional period following publication of a new, amended or revised IEC publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests.

It is the recommendation of the committee that the content of this publication be adopted for implementation nationally not earlier than 12 months or later than 36 months from the date of publication.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

## iTeh Standards (https://standards.iteh.ai) Document Preview

IEC 60335-2-110:2024

IEC 60335-2-110:2024 EXV © IEC 2024 - 9 -

#### INTRODUCTION to IEC 60335-1:2020

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

Guidance documents concerning the application of the safety requirements for appliances can be accessed via TC 61 supporting documents on the IEC website –

www.iec.ch/tc61/supportingdocuments

This information is given for the convenience of users of this International Standard and does not constitute a replacement for the normative text in this standard.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If the functions of an appliance are covered by different parts 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

Throughout this publication, when "part 2" is mentioned, it refers to the relevant part of IEC 60335.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal publications, basic safety publications and group safety publications covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards.

Individual countries may wish to consider the application of this standard, as far as is reasonable, to appliances not mentioned in a part 2, and to appliances designed on new principles. In this case, consideration should be given to defining normal operation, specifying the classification of the appliance according to Clause 6 and specifying whether the appliance is operated attended or unattended. Consideration should also be given to particular categories of likely users and to related specific risks such as access to live parts, hot surfaces or hazardous moving parts.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of this standard if, when examined and tested, it is found to have other features which impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with this standard.

NOTE 3 Standards dealing with non-safety aspects of household appliances are:

- IEC standards published by TC 59 concerning methods of measuring performance;
- CISPR 11, CISPR 14-1 and relevant IEC 61000-3 series standards concerning electromagnetic emissions;
- CISPR 14-2 concerning electromagnetic immunity;
- IEC standards published by TC 111 concerning environmental matters.

## iTeh Standards (https://standards.iteh.ai) Document Preview

IEC 60335-2-110:2024