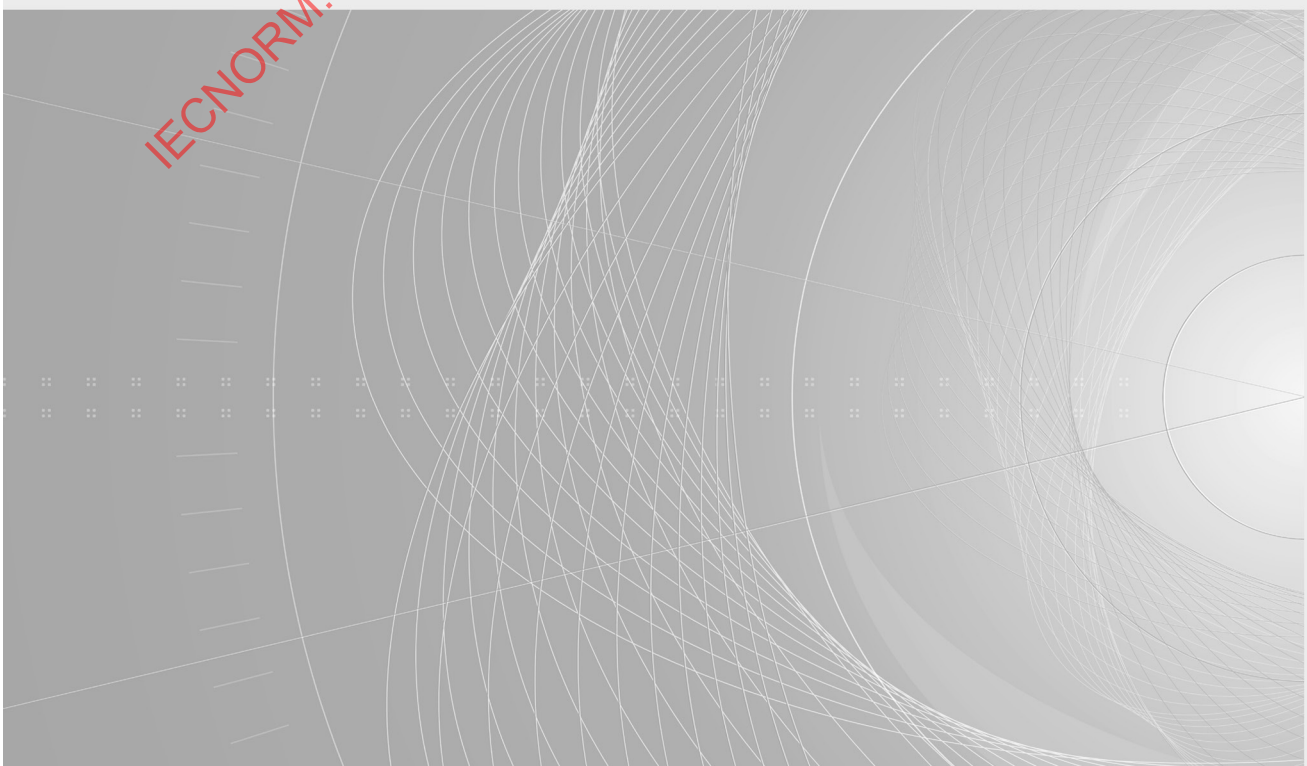
IEC 60335-2-16

Edition 6.0 2022-10

INTERNATIONAL STANDARD

Household and similar electrical appliances – Safety –
Part 2-16: Particular requirements for food waste disposers



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-16: Particular requirements for food waste disposers

FOREWORD

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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60335-2-16 has been prepared by IEC technical committee 61: Safety of household and similar electrical appliances. It is an International Standard.

This sixth edition cancels and replaces the fifth edition published in 2002, Amendment 1:2008 and Amendment 2:2011. This edition constitutes a technical revision.

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

a) alignment with IEC 60335-1:2020;
b) some notes have been converted to normative text (Clause 1, 22.104);
c) addition of temperature rise limits for accessible surface (Clause 11).

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

Draft	Report on voting
61/6442/CDV	61/6532A/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/standardsdev/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.

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 food waste disposers.

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

NOTE 4 The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may 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.

The following differences exist in the countries indicated below.

– Clause 1: The installation of food waste disposers is not allowed (Netherlands).
– Clause 1: Permission to install food waste disposers depends upon the local authority responsible for the sewage system (Finland, Japan and Norway).
– 6.1: Class 0I appliances are allowed (Japan).

INTRODUCTION

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

https://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 can differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 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.

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.

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

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-16: Particular requirements for food waste disposers

1 Scope

This clause of Part 1 is replaced by the following.

This part of IEC 60335 deals with the safety of electric **food waste disposers** for household and similar purposes, their **rated voltage** being not more than 250 V including direct current (DC) supplied appliances and **battery-operated appliances**.

Appliances not intended for normal household use but that nevertheless possibly pose a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

– persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledge

  prevents them from using the appliance safely without supervision or instruction;
– children playing with the appliance.

Attention is drawn to the fact that

– for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements can be necessary;
– in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities, leading to restriction of or prohibition of the installation of **food waste disposers**.

This standard does not apply to

– portable food waste disposers;
– food waste disposers of the incinerator type;
– appliances intended exclusively for industrial or commercial purposes;
– appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas).

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition:

IEC 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*

3 Terms and definitions

This clause of Part 1 is applicable except as follows.

3.1 Definitions relating to physical characteristics

3.1.9 *Addition:*
operation of the appliance under the following conditions:

The hopper is filled with 30 cubes of soft pinewood, the side of each cube having a length of 12 mm ± 2 mm. The appliance is operated with water having a temperature between 10 °C and 24 °C flowing through the appliance at a rate of 8 l/min. If the hopper cannot contain all the cubes at the same time, they are added as quickly as possible during the operation of the appliance.

3.5 Definitions relating to types of appliances

3.5.101
food waste disposer
appliance installed in the outlet of a sink and used for reducing food waste to small particles that are discharged with water into the drainage system

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.101 *Except for Clause 10 and 20.102, the conditions of **normal operation** may be simulated by loading the appliance by means of a dynamometer or by blocking the outlet and maintaining the head of water at a constant level.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Modification:*

Appliances shall be **class I**, **class II** or **class III**.

6.2 *Addition:*

Food waste disposers shall be at least IPX1.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.12 *Addition:*

The instructions shall state the substance of the following:

– do not use this appliance to dispose of hard materials such as glass and metal;
– switch off or unplug the appliance before attempting to free a jammed rotor with an implement.

If a minimum water flow rate is necessary for the operation of the appliance, this information shall be stated.

7.12.1 *Addition:*

The instructions shall state that the appliance must be installed so that reset buttons and reversing switches are readily accessible.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 *Addition:*

The representative period is between the fifth second and the fifteenth second of operation.

10.2 *Addition:*

The representative period is between the fifth second and the fifteenth second of operation.

11 Heating

This clause of Part 1 is applicable except as follows.

11.3 *Addition:*

Where the external ***accessible surfaces*** *are suitably flat and access permits, then the test probe of Figure 101 is used to measure the temperature rises of external* ***accessible surfaces*** *specified in Table 101. The probe is applied with a force of 4 N ± 1 N to the surface in such a way that the best possible contact between the probe and the surface is ensured. The measurement is performed after a contact period of 30 s.*

The probe may be held in place using a laboratory stand clamp or similar device. Any measuring instrument giving the same results as the probe may be used.

11.7 *Modification:*

Appliances of the continuous-feed type are operated for 4 min.

Appliances of the batch-feed type are operated for two periods of 2 min with a rest period of 30 s during which they are switched off.

11.8 *Modification:*

During the test, the temperature rises are monitored continuously and shall not exceed the values shown in Table 3 and Table 101.

Addition:

Table 101 – Maximum temperature rises for specified external accessible surfaces under normal operating conditions

Surface	*Temperature rise of external accessible surfaces* K
Bare metal	*42*
Coated metal [a]	*49*
Glass and ceramic	*56*
Plastic and plastic coating > 0,4 mm [b, c]	*62*
NOTE The temperature rise limits of knobs, grips, keyboards, keypads and similar parts are specified in Table 3.	
[a] *Metal is considered coated when a coating having a minimum thickness of 90 µm made of enamel or non-substantially plastic coating is used.*	
[b] *The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0,1 mm.*	
[c] *When the thickness of the plastic coating does not exceed 0,4 mm, the temperature rise limits of coated metal for underlying metal apply or the temperature rise limits for glass or ceramic material for underlying glass or ceramic material apply.*	

12 Charging of metal-ion batteries

This clause of Part 1 is applicable.

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.2 *Replacement:*

Appliances shall be constructed so that obstruction of the outlet does not affect their electrical insulation.

Compliance is checked by the following test using a spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent.

The outlet of the appliance is blocked and the sink filled with spillage solution to a depth of 200 mm, measured from the lowest point inside the sink. The appliance is supplied at ***rated voltage*** *and operated until a* ***protective device*** *operates or for 15 min, whichever is shorter. The appliance is operated again after a rest period of 15 min.*

Any commercially available non-ionic rinsing agent may be used, but if there is any doubt with regards to the test results, the rinsing agent shall have the following properties:

– *viscosity,17 mPa s;*
– *pH, 2,2 (1 % in water);*
– *and its composition shall comprise the following substances:*
  - *Plurafac ® LF 221*[1] *15,0 % parts by mass*
  - *Cumene sulfonate (40 % solution) 11,5 % parts by mass*
  - *Citric acid (anhydrous) 3,0 % parts by mass*
  - *Deionized water 70,5 % parts by mass*

The appliance shall then withstand the electric strength test of 16.3 and inspection shall show that there is no trace of spillage solution on insulation that could result in a reduction of ***clearances*** *and* ***creepage distances*** *below the values specified in Clause 29.*

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

[1] Plurafac ® LF 221 is the trade name of a product supplied by BASF. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.7 *Modification:*

Appliances are operated without water for

– *30 s, for continuous-feed types;*
– *5 min, for batch-feed types.*

19.9 Not applicable.

20 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows.

20.2 *Addition:*

The test probes are not applied to the inlet of the appliance.

20.101 Unless access to moving parts through the inlet opening is otherwise prevented, any cover over the inlet opening shall be interlocked so that the appliance can only be operated when the cover is in the closed position.

*Compliance is checked by inspection and by means of test probe 31 of IEC 61032 applied with a force of 50 N to the inlet opening with any cover in the open position, the appliance being supplied at **rated voltage** with **detachable parts** preventing food waste from being ejected or preventing utensils from falling into the grinding chamber removed. It shall not be possible to touch moving parts with the probe and they shall be located at least 100 mm from the top of the inlet.*

*If compliance utilizes an interlocked cover that relies on an **electronic circuit**, the appliance is further tested as follows.*

*The appliance is supplied at **rated voltage** and operated under **normal operation**. The tests of 19.11.4.1 to 19.11.4.7 are then applied. It shall not be possible to open the cover during and after the tests with a force of 50 N applied to the cover. The tests are carried out with surge protective devices disconnected, unless they incorporate spark gaps.*

*The appliance is supplied at **rated voltage** and operated under **normal operation**. The fault conditions in a) to g) of 19.11.2 are then considered and, if necessary, applied one at a time to the **electronic circuit**. It shall not be possible to open the cover during and after the tests with a force of 50 N applied to the cover.*

*If the **electronic circuit** is programmable, the software shall contain measures to control the fault/error conditions specified in Table R.1 and is evaluated in accordance with the relevant requirements of normative Annex R.*

20.102 Food waste shall not be ejected through the inlet opening.

*Compliance is checked with the appliance supplied at **rated voltage** and operated under **normal operation**. Pieces of the wooden cubes shall not be ejected into the sink.*

21 Mechanical strength

This clause of Part 1 is applicable.

22 Construction

This clause of Part 1 is applicable except as follows.

22.10 *Addition:*

Protective devices shall not be self-resetting and shall be trip-free.

22.101 Appliances shall incorporate a **protective device**.

Compliance is checked by inspection.

22.102 The reset button of a **protective device** shall be recessed or otherwise guarded.

*Compliance is checked by applying a rod in any direction when the contacts of the **protective device** are in the closed position. The rod has a diameter of 16 mm ± 0,1 mm and a flat end. There shall be a distance of at least 1,5 mm between the rod and the reset button.*

22.103 Appliances shall be so constructed that the feed chamber and guards can be cleaned.

Compliance is checked by inspection.

22.104 The surface material of the grinding chamber shall be resistant to mechanical damage and attack by food waste. It shall not be natural rubber.

Compliance is checked by inspection and the following test.

A mild steel bar, having dimensions approximately 100 mm × 12 mm × 3 mm, is inserted into the grinding chamber and positioned to reduce the likelihood of the motor stalling.

*The appliance is supplied at **rated voltage** and operated for 15 s unless the motor stalls first.*

After the test, the appliance shall comply with 8.1, 15.2 and Clause 29.

NOTE A test can be necessary to verify the resistance to attack by food waste.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable except as follows.

24.101 Thermal cut-outs and **protective devices** incorporated in appliances of the continuous-feed type for compliance with Clause 19 shall not be self-resetting.

Compliance is checked by inspection.

25 Supply connection and external flexible cords

This clause of Part 1 is applicable.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2 *Modification:*

Replace the two dashed items in the compliance criteria with the following:

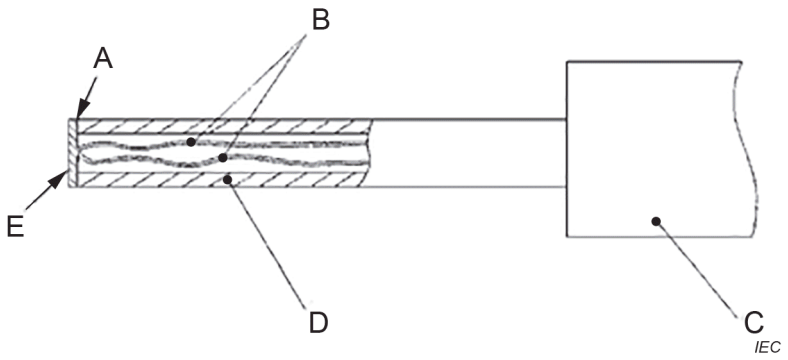
– *for **food waste disposers**, 30.2.2 is applicable.*

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.



Key

A adhesive

B thermocouple wires 0,3 mm diameter to IEC 60584-1 Type K

C handle arrangement permitting a contact force of 4 N ± 1 N

D polycarbonate tube: inside diameter 3 mm, outside diameter 5 mm

E tinned copper disc: 5 mm diameter, 0,5 mm thick with a flat contact face

Figure 101 – Probe for measuring surface temperatures

Annexes

The annexes of Part 1 are applicable except as follows.

Annex C
(normative)

Ageing test on motors

Modification:

The value of *p* in Table C.1 is 2 000.