# IEC 61000-3-2

Edition 5.0 2020-07

# INTERNATIONAL STANDARD

AMENDMENT 1

## Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)



IEC 61000-3-2:2018-01/AMD1:2020-07(en)

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## Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase)



INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.100.10

ISBN 978-2-8322-8585-5

# FOREWORD

This amendment has been prepared by subcommittee 77A: EMC – Low frequency phenomena, of IEC technical committee 77: Electromagnetic compatibility.

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

| FDIS | Report on voting |
|---|---|
| 77A/1077/FDIS | 77A/1084/RVD |

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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



# INTRODUCTION

*Replace, under* “Part 2: Environment”, *the first line* “Description levels” *with the following:*

Description of the environment

## 1 Scope

*Replace the fourth paragraph with the following:*

Arc welding equipment, which is not professional equipment, with a rated input current up to and including 16 A per phase, is included in the scope of this document. All other arc welding equipment is excluded from the scope of this document; however, the harmonics emission can be evaluated using IEC 61000-3-12 and relevant installation restrictions.

## 2 Normative references

*Replace the references with the following:*

IEC 60050-161:1990, *International Electrotechnical Vocabulary (IEV) – Part 161: Electromagnetic compatibility* (available at www.electropedia.org)

IEC 60107-1:1997, Methods *of measurement on receivers for television broadcast transmissions – Part 1: General considerations – Measurements at radio and video frequencies*

IEC 60155:1993, *Glow-starters for fluorescent lamps*

IEC 60268-1:1985, *Sound system equipment – Part 1: General*
IEC 60268-1:1985/AMD1:1988
IEC 60268-1:1985/AMD2:1988

IEC 60268-3:2018, *Sound system equipment – Part 3: Amplifiers*

IEC 60335-2-2:2019, *Household and similar electrical appliances – Safety – Part 2-2: Particular requirements for vacuum cleaners and water-suction cleaning appliances*

IEC 60335-2-14:2016, *Household and similar electrical appliances – Safety – Part 2-14: Particular requirements for kitchen machines*

IEC 60335-2-24:2010, Household *and similar electrical appliances – Safety – Part 2-24: Particular requirements for refrigerating appl iances, ice-cream appliances and ice makers*
IEC 60335-2-24:2010/AMD1:2012
IEC 60335-2-24:2010/AMD2:2017

IEC 60335-2-79:2016, Household *and similar electrical appliances – Safety – Part 2-79: Particular requirements for high pressure cleaners and steam cleaners*

IEC 60598-2-17:2012, *Luminaires – Part 2-17: Particular requirements – Luminaires for stage lighting, television and film studios (outdoor and indoor)*
IEC 60598-2-17:2012/AMD1:2015

IEC 60974-1:2017, *Arc welding equipment – Part 1: Welding power sources*

IEC 61000-4-7:2002, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto*
IEC 61000-4-7:2002/AMD1:2008

IEC 62756-1:2015, *Digital load side transmission lighting control (DLT) – Part 1: Basic requirements*

## 3 Terms and definitions

*Replace definition 3.2 including Note 1 to entry with the following:*

**3.2**
**lamp**
light source provided with at least one cap

Note 1 to entry: For products that have the same physical characteristics as lamps for general lighting but that are built to emit optical radiation mainly in the IR or UV spectrum, the term IR lamp or UV lamp is often used.

[SOURCE: IEC 60050-845:2020, 845-27-008, modified – existing notes 2 and 3 have been removed, the term “electric” has been removed from the term and the definition]

*Replace definition 3.3 with the following:*

**3.3**
**integrated lamp**
electric lamp which cannot be dismantled without being permanently damaged, incorporating lighting control gear, and all additional elements necessary for starting and stable operation of the light source, designed for direct connection to the supply voltage

[SOURCE: IEC 60050-845:2020, 845-27-009]

*Replace definition 3.4 with the following:*

**3.4**
**luminaire**
apparatus which distributes, filters or transforms the light transmitted from at least one source of optical radiation and which includes, except the sources themselves, all the parts necessary for fixing and protecting the sources (IEV 845-21-032) and, where necessary, circuit auxiliaries together with the means for connecting them to the power supply

[SOURCE: IEC 60050-845: 845-30-001:2020, modified – existing note has been removed]

*Replace definition 3.6 with the following:*

**3.6**
**void**

*Replace definition 3.7 with the following and delete Note 1 to entry:*

**3.7**
**active input power**
mean value of the instantaneous power, taken over 10 (50 Hz systems) or 12 (60 Hz systems) fundamental periods and measured in accordance with IEC 61000-4-7:2002 and IEC 61000-4-7:2002/AMD1:2008 at the input supply terminals of the equipment under test

**3.12**
**partial odd harmonic current**

*Add the following new note to entry:*

Note 1 to entry: Details for the calculation of the $POHC$ are given in Annex C.

*Renumber the existing Note 1 to entry as Note 2 to entry.*

*Replace definition 3.13 including note 1 to entry with the following:*

**3.13**
**lighting equipment**
equipment with a primary function of generating and/or regulating and/or distributing the radiation emitted by a light source

Note 1 to entry: See also 5.2.

*Replace definition 3.19 including all notes to entry with the following:*

**3.19**
**lighting control gear**
unit inserted between the power supply and at least one light source, which serves to supply the light source(s) with the voltage and/or current required for its (their) intended operation, and which can consist of one or more separate components.

Note 1 to entry: The lighting control gear can include means for igniting, dimming, correcting the power factor and suppressing radio interference, and further control functions.

Note 2 to entry: The lighting control gear can be partly or totally integrated in the light source.

Note 3 to entry: For the purposes of this document, independent phase control dimmers as defined in 3.23 and 3.24 are not considered to be lighting control gear.

*Replace definition 3.20 with the following.*

**3.20**
**digital load side transmission lighting control device**
**DLT control device**
device to control lighting parameters of electronic lighting equipment, such as light level and light colour, using data transmission over its load side mains wiring in accordance with IEC 62756-1:2015

Note 1 to entry: A DLT control device is wired like a phase control dimmer, but does not directly make the supply power delivered to the connected dedicated lighting equipment vary. It transmits digital signals over the power cable on the load side to the dedicated lighting equipment, which contains means for receiving and interpreting control signals as well as built-in means for dimming, colour variation and other operating features.

Note 2 to entry: This note applies to the French language only.

*Replace definition 3.21 with the following:*

**3.21**
**dimmer**
device for varying the luminous flux from light sources

[SOURCE: IEC 60050-845: 845-28-063:2020, modified – the existing note has been removed]

*Replace definition 3.26 with the following:*

**3.26**
**professional luminaire for stage lighting and studios**
luminaire (outdoor or indoor) for stage lighting or for television, film or photographic studios within the scope of IEC 60598-2-17:2012 and IEC 60598-2-17:2012/AMD1:2015 and which is professional equipment

*Add the following new terms:*

**3.27**
**light source**
surface or object emitting light

[SOURCE: IEC 60050-845:2020, 845-27-001, modified – the existing notes have been removed]

**3.28**
**instructions for use**
information that is provided by manufacturers or distributors for users of the product

**3.29**
**external power supply**
**EPS**
equipment which converts power supplied by the mains into power at a different voltage, which has its own physical enclosure, and which is intended for use with separate equipment that constitutes the load

Note 1 to entry: The output voltage of the EPS can be either AC or DC.

Note 2 to entry: The output of the EPS can be either detachable from, or permanently connected to, the separate equipment being powered.

Note 3 to entry: See also 5.3.

## 5 Classification of equipment

### 5.1 General

*Replace the first sentence under Class D with the following:*

Equipment having a specified power less than or equal to 600 W according to 6.3.2, of the following types:

### 5.2 Description of lighting equipment

*Replace the existing text with the following:*

In this document, lighting equipment as defined in 3.13 includes:

– light sources, lamps, integrated lamps and luminaires;
– the lighting part of multi-function equipment where one of the primary functions of this is illumination;
– independent lighting control gear;
– ultraviolet (UV) and infrared (IR) radiation equipment;
– illuminated advertising signs;
– independent dimmers, other than phase control types, for lighting equipment;
– DLT control devices.

In this document, lighting equipment as defined in 3.13 excludes:

– lighting devices built in equipment with another primary purpose, such as photocopiers, overhead projectors and slide projectors, or employed for scale illumination or indication purposes;
– household appliances whose primary function is not for generating and/or regulating and/or distributing optical radiation, but which contain one or more light sources with or without a separate switch (e.g. a range hood with a built-in light source);
– independent phase control dimmers;
– professional luminaires for stage lighting and studios;
– emergency luminaires that emit light only during emergency mode;
– professional appliances whose primary function is to present lighting devices for exhibition purposes;
– mechanical switches and relays, and other simple devices providing on/off control only, that do not produce distorted currents.



*Add, after 5.2, the following new subclause:*

### 5.3 External power supplies

EPS shall be classified according to the types of equipment they are designated for, as specified in the instructions for use.

NOTE See also Clause B.17.

### 6.2 Control methods

*Replace the existing text with the following:*

Asymmetrical controls according to IEC 60050-161:1990, 161-07-12, and half-wave rectification directly on the mains supply may only be used where:

a) they are the only practical solution permitting the detection of unsafe conditions, or

b) they control an active input power less than or equal to 100 W, or

c) they are operated in a portable equipment fitted with a two-core flexible cord which is intended for use for a short period of time, i.e. for a few minutes only.

If at least one of these three conditions is fulfilled, half-wave rectification may be used for any purpose, whereas asymmetrical controls may only be used for the control of motors.

NOTE 1 Equipment which can fulfil condition c) includes, but is not limited to, hair dryers, electrical kitchen appliances and portable tools.

NOTE 2 When using asymmetrical controls or half-wave rectification under the above circumstances, the input current has a DC component that can disturb certain types of protection devices in case of an earth fault. See IEC TR 60755.

Even though asymmetrical controls and half-wave rectification are permitted under the conditions given above, equipment shall still comply with the harmonic requirements of this document.

In general, symmetrical controls may be used for any application and without particular restrictions. However, symmetrical control methods which can produce integer harmonics of the mains frequency up to the 40$^{th}$ order in the mains input current may be used to control the power supplied to heating elements only if at least one of the following restrictions is met:

- the full sine-wave active input power of these heating elements is lower than or equal to 200 W, or
- the limits of Table 3 are not exceeded when testing with these heating elements active.

Such symmetrical control methods are also allowed for professional equipment provided that either one of the above conditions is fulfilled, or the relevant emission limits according to Clause 7 are not exceeded when tested at the supply input terminals and in addition both the following conditions are fulfilled:

– it is necessary to control precisely the temperature of a heater whose thermal time constant is less than 2 s, and

– there is no other technique economically available.

Professional equipment whose primary purpose, considered as a whole, is not for heating, shall be tested against the relevant emission limits according to Clause 7.

NOTE 3 An example of a product whose primary purpose, considered as a whole, is not for heating is a photocopier, whereas a cooker is considered to have heating as its primary purpose.

For domestic equipment used for a short time (e.g. hair dryers) the above restrictions for symmetrical control of heating elements shall not apply and the limits for Class A shall apply instead.

For the application of this document diode rectification is not considered to be a form of control.

### 6.3.2 Measurement procedure

*In the second paragraph replace the first dash with the following:*

– for each harmonic order, measure the 1,5 s smoothed RMS harmonic current in each discrete Fourier transform (DFT) time window as defined in IEC 61000-4-7:2002 and IEC 61000-4-7:2002 /AMD1:2008;

*Replace the third paragraph with the following and delete the Note:*

The value of the active input power to be used for the calculation of limits shall be determined as follows:

– measure the 1,5 s smoothed active input power in each DFT time window;
– determine the maximum of the measured values of active input power from the DFT time windows over the entire duration of the test.

*Replace the last paragraph with the following:*

For Class C equipment, the fundamental current specified by the manufacturer shall be used for the calculation of limits. The fundamental component of the current is measured and specified by the manufacturer in the same way as the power is measured and specified for the calculation of Class D limits.

#### 6.3.3.1 Repeatability

*Replace the text with the following:*

The repeatability (see 3.15) of the average value for the individual harmonic currents over the entire test observation period should be better than ±5 % of the applicable limit, when the following conditions are met:

– the same equipment under test (EUT) (not another of the same type, but the exact same specimen);
– the same test system;
– the same location;
– identical test conditions;
– identical climatic conditions, if relevant.

This repeatability recommendation serves the purpose of defining the necessary observation period (see 6.3.4), but not as a pass/fail criterion for the assessment of compliance with the requirements of this document.

#### 6.3.3.4 Application of limits

*Replace the first paragraph with the following:*

The average values for the individual harmonic currents, taken over the entire test observation period, shall be less than or equal to the applicable limits.

*Replace all occurrences of the term* “partial odd harmonic current” *with “*POHC”.

*Add at the end of 6.3.3.4 the following sentence:*

Details for the calculation of the POHC are defined in Annex C.

#### 6.3.3.5 Test report

*Delete, at the end of the existing text, the words* “and power factor”.

*Add, after 6.4, the following new subclause:*

### 6.5 Multifunction equipment

If not otherwise specified in this document, multifunction equipment which has more than one independent function shall be tested according to the following provisions.

NOTE 1 Independent functions do not intentionally interact with each other.

Multifunction equipment may be tested with each function operated alone if this can be achieved with reasonable effort. The equipment thus tested complies with the requirements of this document when each function has satisfied the requirements for the relevant class of equipment belonging to the function.

For equipment for which it is not obvious how to operate each function alone, the manufacturer may provide instructions for testing purposes explaining how the function can be operated alone. These instructions may specify internal changes in the equipment. The equipment shall be tested accordingly.

If no instruction for testing purposes is provided or if it is not possible to test the equipment with each function operated alone, the equipment complies with this document, if it meets the most stringent of the relevant limits with all functions operating simultaneously. However, if one of the functions can be clearly identified as the main function in comparison with the other functions, the equipment may be tested with all functions operating simultaneously against the limits for the main function.

NOTE 2 For example, a refrigerator equipped with a TV on the door still has cooling as the main function.

### 7.1 General

*Delete, in the second paragraph, the fourth dash point* "symmetrically controlled heating elements with a rated power less than or equal to 200 W;"

*Replace Note 3 with the following:*

NOTE 3 The lower bound for leading edge dimmers and universal phase control dimmers without default mode set to trailing edge is lower than the lower bound for trailing edge dimmers because the higher order harmonic emissions of leading edge dimmers are significantly higher when loaded with light sources other than incandescent lamps.

*Add the following new paragraph after Note 3:*

Limits are not specified for symmetrically controlled heating elements with a controlled active input power less than or equal to 200 W.

### 7.4.3 Rated power ≥ 5 W and ≤ 25 W

*Replace the last paragraph with the following:*

If the lighting equipment includes means for control (e.g. dimming, colour), or is specified to drive multiple loads, then the measurement is made only at the control setting and at the load of the light sources that gives the maximum active input power.

**Table 2 – Limits for Class C equipment**

*Replace* "30·λ" *by* "27" *(for harmonic order 3).*

*Replace the text of the existing footnote b with the following:*

The limit is determined based on the assumption of modern lighting technologies having power factors of 0,90 or higher.

**Table 4**

*Replace Table 4 with the following:*

**Table 4 – Test observation period**

| Type of equipment behaviour | Observation period |
|---|---|
| Quasi-stationary | $T_{obs}$ of sufficient duration, so that it can be expected to meet the recommendations for repeatability in 6.3.3.1 |
| Short cyclic ($T_{cycle}$ ≤ 2,5 min) | $T_{obs}$ ≥ 10 cycles (reference method) or $T_{obs}$ of sufficient duration or synchronization, so that it can be expected to meet the recommendations for repeatability in 6.3.3.1 [a] |
| Random | $T_{obs}$ of sufficient duration, so that it can be expected to meet the recommendations for repeatability in 6.3.3.1 |
| Long cyclic ($T_{cycle}$ > 2,5 min) | Full equipment program cycle (reference method) or a representative 2,5 min period expected to be the operating period with the highest *THC* |
| [a] 'Synchronization' means that the total observation period is sufficiently close to including an exact integral number of equipment cycles such that the recommendations for repeatability in 6.3.3.1 are met. | |

*Add, after Clause 7, the following new Clause 8:*

## 8 Compliance with this document

Unless otherwise stated, where this document gives options for evaluating harmonics with a choice of test methods and associated limits, any one of these options may be used.

The equipment is deemed to comply with this document with respect to the addressed EMC characteristics when one of the test methods returns a test result compliant with the applicable requirements.

In any situation where it is necessary to verify the original compliance assessment result, the option originally chosen shall be used to avoid excessive uncertainties induced by applying different test methods.



## Annex A

### A.1 Test circuit

*Replace the last paragraph with the following:*

Measurement equipment complying with IEC 61000-4-7:2002 and IEC 61000-4-7:2002/AMD1:2008 shall be used. Specific test conditions for some types of equipment are given in Annex B.

### A.2 Supply source

*Replace the text of the first paragraph of item c) with the following:*

c) The ratio of the voltage harmonics to the RMS value of $U$ shall not exceed the following values:

**Figure A.1**

*Replace in Figure A.1, the abbreviation "EU" with the abbreviation* "EUT".

## Annex B

*Delete, in all the headings of Annex B, the words* "Test conditions for"

### B.1 General

*Replace the text (excluding the note) with the following:*

The test conditions for the measurement of harmonic currents associated with some types of equipment are given in Clauses B.2 to B.17.

#### B.2.2.1 Input signal

*Replace the second and third paragraphs with the following:*

The video signal shall be the colour bar signal as defined in IEC 60107-1:1997, 3.2.1.2.

The audio signal shall be a 1 kHz sinusoidal signal.

#### B.3.1 Conditions

*Replace the first paragraph with the following:*

Audio amplifiers which draw a supply current which varies less than 15 % of the maximum current with input signal voltages between zero and a rated source e.m.f. (as defined in IEC 60268-3:2018) shall be tested with no input signal.

#### B.3.2 Input signals and loads

*Replace the first paragraph and items a) and b) with the following text and renumber Note 1 as Note:*

The following test procedure shall be applied:

a) Connect suitable resistors, equal to the rated load impedance(s), to each amplifier output for supplying loudspeakers. To monitor the output voltage waveform of the audio amplifier of a powered loudspeaker, the audio analyser/oscilloscope is connected to internal wiring at a point representing the electrical output of the amplifier.

   NOTE In the case of powered loudspeakers with internal audio amplifiers, the load corresponds to the loudspeaker and associated crossover network

b) Apply a sinusoidal signal at 1 kHz to a suitable input. For multi-channel amplifiers in which the surround sound channel amplifiers cannot be alternatively used as a second set of left and right channel amplifiers, set the controls so that the surround sound channel amplifiers are supplied with signal at a level 3 dB lower than the signal applied to the left and right channel.

   For products not intended to reproduce 1 kHz signals, a frequency geometrically centred within the reproducing bandwidth of the amplifier shall be applied.

*Replace the second sentence of item f) with the following:*

The sinusoidal signal shall be substituted by a pink noise signal of the same RMS voltage, bandwidth-limited as specified in IEC 60268-1:1985, IEC 60268-1:1985/AMD1:1988 and IEC 60268-1:1985/AMD2:1988, 6.1.

### B.5.2 Lamps

*Replace the title and text with the following:*

### B.5.2 Light sources

Discharge light sources shall be aged for at least 100 h at rated voltage. Discharge light sources shall be operated for at least 15 min before a series of measurements is made. Some light sources require a stabilization period exceeding 15 min. Information given in the relevant IEC performance standard shall be observed.

During ageing, stabilization and measurement, light sources shall be installed as in normal use. Integrated lamps shall be operated in cap-up position.

### B.5.3 Luminaires

*Replace the existing text with the following:*

Luminaires shall be tested as manufactured and with the included devices. Devices shall be assembled as stated in the instructions for use.

NOTE 1 Examples of devices to be assembled are light sources and separate lighting control gear.

Luminaires which comprise only passive devices that produce no harmonic currents are deemed to comply with this document and need not to be tested.

NOTE 2 Examples of passive devices are lamp holders and electromechanical switches.

If the luminaire additionally incorporates further independent functions that do not intentionally interact with the lighting function and that belong to Class A or Class D, as specified in 5.1, it may be tested with each independent function operated alone, if this can be achieved without modifying the luminaire. For luminaires for which it is not obvious how to operate each independent function alone without modifying the luminaire, the manufacturer may provide an instruction for testing purposes of how each independent function can be operated alone. This instruction may specify changes in the luminaire. The luminaire shall be tested accordingly.

The luminaire thus tested complies with the requirements of this document when each independent function has satisfied the requirements for the relevant class of equipment belonging to the function. If no instruction for testing purposes is provided or if it is not possible to test the equipment with each function operated alone, or if further functions belonging to Class A or Class D intentionally interact with the lighting function, the equipment complies with this document if it meets the limits for Class C equipment with all functions operating simultaneously.

NOTE 3 For example, a function can be operated alone by setting the others into an off or standby mode, if provided.

NOTE 4 An example of an independent function is a surveillance camera, which is also active when the light is switched off.

NOTE 5 An example of a function that intentionally interacts with the lighting function is a motion detector that controls the light output of the luminaire.

If separate tests, as specified in B.5.4, have proved that the included lighting control gear, being specified and configured for use with the luminaire, complies with the applicable luminaire requirements and if any included independent devices comply with the specific requirements of this document, the luminaire is deemed to comply with these requirements and need not be checked. If this is not the case, the luminaire itself shall be tested and shall comply.

Testing, if required, shall be performed with light sources having electrical characteristics close to those specified in the instructions for use.

If the luminaire can incorporate more than one light source and/or more types of light sources, the tests shall be performed for each type of light source when operating the maximum number of light sources compatible with normal use as specified in the instructions for use.

As an alternative to light sources, artificial loads having electrical characteristics close to those of the relevant type of light sources may be used.

If the luminaire is equipped with a glow starter, a starter in accordance with IEC 60155:1993 shall be used.

### B.5.4 Lighting control gear

*Replace the existing text with the following:*

Subclause B.5.4 is not applicable to lighting control gear which is tested as part of a luminaire according to B.5.3.

Lighting control gear shall be tested with the light sources specified in their instructions for use or with artificial loads having electrical characteristics close to those light sources.

If the lighting control gear is designed for more than one type of light source or if the control gear is designed to additionally power auxiliary loads (e.g. a sensor or a camera), the manufacturer shall specify in the instructions for use of the lighting control gear for which load characteristics (light sources, auxiliary loads) the lighting control gear fulfils the relevant harmonic requirements and the lighting control gear shall be tested for each corresponding load characteristic and shall comply in each case.

If the lighting control gear can also be used with a series capacitor, the manufacturer shall specify in the instructions for use of the control gear for which type of circuit (with or without series capacitor) the lighting control gear fulfils the harmonic requirements, and the lighting control gear shall be tested for each corresponding type of circuit and shall comply in each case.

## B.7 Vacuum cleaners

*Replace the text with the following:*

The air inlet of the vacuum cleaner shall be adjusted according to normal operation as defined in IEC 60335-2-2:2019.

Vacuum cleaners with variable input power shall be tested in three modes of operation, each for an identical time interval that is at least 2 min long, with the control adjusted:

– to maximum input power,
– to 50 % ± 5 % of the maximum active input power, or, if that is not possible (e.g. controlled in steps), to the point closest to 50 % that is supported by the equipment design, and
– to minimum input power.

NOTE If the active input power at minimum input power is higher than 50 % of the maximum active input power, the above requirements imply that the vacuum cleaner is tested for three identical time intervals: one time interval with the control adjusted to maximum input power and two time intervals with the control adjusted to minimum input power.

These three time intervals need not be consecutive, but the limits according to 6.3.3.4 are applied as if the intervals were consecutive. In that case, the entire test observation period is made up of the three identical time intervals, without taking into account harmonic current values outside these three intervals.

If the vacuum cleaner includes a control to select a temporary high-power ("booster") mode of operation, which automatically returns to a lower power mode, this high-power mode is not considered for the calculation of the average values. This mode shall be tested only against the limits for single 1,5 s smoothed RMS values (see 6.3.3.4).

## B.9 Microwave ovens

*Replace the text with the following:*

The microwave oven shall be tested for a period of 5 min at the maximum power setting. The EUT shall be operated with a potable water load of initially 1 000 g ± 50 g in a cylindrical borosilicate glass vessel, having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm. The load shall be placed at the centre of the shelf. The microwave heating shall be switched on 10 s to 15 s before the observation period starts. In order to prevent a measurement in stand-by mode, the measurement shall be finished before the microwave oven stops its operation.

### B.10.2 Optional conditions for measuring emissions of IT equipment with external power supplies

*Replace the title and text with the following:*

### B.10.2 IT equipment with external power supplies

For IT equipment with external power supplies, see Clause B.17.

## B.13 Kitchen machines as defined in IEC 60335-2-14

*Replace the text with the following:*

Kitchen machines as listed in the scope of IEC 60335-2-14:2016 are deemed to comply with the requirements of this document without testing.

## B.14 Arc welding equipment which is not professional equipment

*Replace the last sentence with the following:*

In order to establish the test conditions provided in Clause B.14, the definitions for conventional load, $I_{2max}$, $I_2$ and $U_2$, given in IEC 60974-1:2017 shall be used.

## B.15 Pressure cleaners which are not professional equipment

*Replace the first paragraph with the following:*

The high-pressure cleaner shall be adjusted according to normal operation as defined in IEC 60335- 2-79:2016 except for the electronic power control.

### B.16.2 Refrigerators and freezers with VSD

*Replace, in the second paragraph the explanatory text for $I_m$ with the following:*

$I_m$ is the current in amperes of the appliance, which shall be measured according to IEC 60335-2-24:2010, IEC 60335-2-24:2010/AMD1:2012 and IEC 60335-2-24:2010/AMD2:2017, 10.2;

*Add the following new Clause B.17:*

## B.17 External power supplies (EPS)

### B.17.1 EPS designated for specific models of equipment

The requirements in 17.1 apply to EPS that are designated for specific models of equipment (e.g. a luminaire made by a specific manufacturer or a kitchen mixer of a certain brand).

These designated EPS shall be tested together with the specific models of equipment using the test conditions specified for the equipment.

### B.17.2 EPS not designated for specific models of equipment

The requirements in 17.2 apply to EPS that are designated for one or more generic types of equipment (e.g. for a lamp and an appliance) and which are not specified for use with specific models of equipment (e.g. a luminaire made by a specific manufacturer or a kitchen mixer of a certain brand).

These EPS shall be tested with loads or artificial loads having characteristics close to the type(s) of equipment to be powered, as specified in the instructions for use.

The manufacturer or distributor of the EPS shall specify in the instructions for use which types of equipment it can power. The types of powered equipment shall be consistent with the classes specified in Clause 5, and the EPS shall meet the requirements and the limits specified for those classes.

NOTE 1 For example, if the specified types of equipment are "luminaire" and "kitchen mixer", then Class C and Class A requirements apply to the EPS.

NOTE 2 See also 5.3.

*Add the following new Annex C:*