

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Electric room heating – Underfloor heating – Performance characteristics –
Definitions, method of testing, sizing and formula symbols**

**Chauffage électrique de locaux – Chauffage par le sol – Caractéristiques de
performance – Définitions, méthode d'essai, calibrage et symboles de formule**

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 97.100.10

ISBN 978-2-8322-1033-9

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC ROOM HEATING – UNDERFLOOR HEATING –
PERFORMANCE CHARACTERISTICS – DEFINITIONS,
METHOD OF TESTING, SIZING AND FORMULA SYMBOLS**

AMENDMENT 1

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Amendment 1 to IEC 62999:2016 has been prepared by subcommittee 59C: Electrical heating appliances for household and similar purposes, of IEC technical committee 59: Performance of household and similar electrical appliances.

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

CDV	Report on voting
59C/250/CDV	59C/263/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 Amendment 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/.

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- withdrawn,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

1 Scope

Add the following text at the end of the existing clause:

"Annexes D and E are added for information purposes about performance testing according to the European Commission Regulation (EU) 2015/1188."

Addition of the following annexes: [IEC 62999:2016/AMD1:2021](http://standards.iteh.ai/catalog/standards/sist/66cc64f9-dfa2-40fc-aa29-7e0b98ca86c2/iec-62999-2016-amd1-2021)
<http://standards.iteh.ai/catalog/standards/sist/66cc64f9-dfa2-40fc-aa29-7e0b98ca86c2/iec-62999-2016-amd1-2021>

Annex D (informative)

Complete performance test according to Commission Regulation (EU) 2015/1188

D.1 Test conditions

The control device should be installed according to the manufacturer specification.

The test room could be according to specification set out in IEC 60675. The underfloor heating power is according to the manufacturer specification. Recommended floor covering is parquet flooring.

An option is to test in any space that requires a heat demand sufficient to demonstrate the functions to be tested. To facilitate functional testing, underfloor heating could be replaced by another heat source e.g. convector heater with the power equal to the power of any underfloor heating that would have been installed in the actual space. Floor covering could be parquet flooring or any covering defined by the manufacturer (recommendation for test conditions could differ from the installation manual).

D.2 Definitions

For the purpose of Annex D, the following definitions apply.

D.2.1

room temperature control

mechanical or electronic device, sensitive to the room temperature and adjustable by the user

D.2.2

programmer

control for regulating the room temperature according to a programmed preset by the user and which is incorporated in the heater

D.2.3

setback function device

device function which allows the room temperature to be maintained at a lower value than the pre-set (comfort) temperature without changing the setting of the room temperature control

D.2.4

frost protection means

means which allows the room temperature to be maintained at a value of $7\text{ °C} \pm 3\text{ °C}$

Note 1 to entry: The means may be a particular setting of the room temperature control.

D.2.5

rated power input

power input assigned to the heater by the manufacturer

D.2.6

energy ratio

ratio between the energy consumption during a representative period of operation and the product of the rated power input and this period

D.2.7

average room temperature

arithmetic average of the maximum and minimum room temperatures for a setting of the room temperature control

D.2.8

amplitude

difference between the maximum and the minimum room temperatures for a setting of the room temperature control

D.2.9

drift

difference between the average room temperatures obtained at different energy ratios for a setting of the room temperature control

D.2.10

nominal heat output

P_{nom}

heat output of a local space heater comprising both direct heat output and indirect heat output (where applicable), when operating at the setting for the maximum heat output that can be maintained over an extended period as declared by the manufacturer, expressed in "x,x kW

D.2.11

minimum heat output

P_{min}

heat output of a local space heater comprising both direct heat output and indirect heat output (where applicable), when operating at setting of the lowest heat output, as declared by the manufacturer, expressed in x,x/N.A. kW

D.2.12

maximum continuous heat output

$P_{\text{max,c}}$

declared heat output of an electric local space heater when operating at the setting for the maximum heat output that can be maintained continuously over an extended period, as declared by the manufacturer, expressed in x,x kW

D.2.13

electric power requirement in standby mode

el_{sb}

electric power consumption of the product while in standby mode, expressed in x,xxx kW

Note 1 to entry: This is only applicable if the product has a "standby mode". For electric local space heaters without a standby mode, the value is zero.

D.2.14

standby mode

state of the product where the heating function has been deactivated without disconnection from mains or switching power off

Note 1 to entry: Independent from external conditions (room temperature, time, or control signals) the unit will not start heating; to resume the heating function a (manual) reactivation by the user is required. In standby mode only the following functions are provided, which can persist for an indefinite time:

- reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or
- information or status display

D.2.15

auxiliary electricity consumption at nominal heat output

el_{max}

auxiliary energy consumed at nominal heat output

Note 1 to entry: This value is zero for electric local space heaters. All electric power consumption is included in the nominal heat output (P_{nom})

D.2.16

auxiliary electricity consumption at minimum heat output

e_{min}

auxiliary energy consumed at minimum heat output

Note 1 to entry: This value is zero for electric local space heaters. All electric power consumption is included in the minimal heat output (P_{min}).

D.2.17

heater with single stage heat output

product that is not equipped with a room temperature control and therefore is not capable of varying its heat output automatically and that no feedback of room temperature is present to adapt the heat output automatically

D.2.18

heater with two or more manual stages

product that is not equipped with a room temperature control but with a possibility to manually vary the heat output and therefore is capable of varying its heat output manually by two or more levels of heat output and is not equipped with a device that automatically regulates the heat output in relation to a desired indoor temperature

D.2.19

heater with mechanical thermostat room temperature control

product that is equipped with a non-electronic device that allows it to automatically vary its heat output over a certain time period, in relation to a certain required level of indoor heating comfort

Note 1 to entry: Varying the heat output can be achieved by variable intermittent switching of the power.

D.2.20

heater with electronic room temperature control

product that is equipped with an electronic device, either integrated or external, that allows it to automatically vary its heat output over a certain time period, in relation to a certain required level of indoor heating comfort

Note 1 to entry: Varying the heat output can be achieved by variable intermittent switching of the power.

D.2.21

heater with electronic room temperature control plus day timer

product that is equipped with an electronic device, either integrated or external, that allows it to automatically vary its heat output over a certain time period, in relation to a certain required level of indoor heating comfort, and allows the setting of timing and temperature level for a 24-hour timer interval

D.2.22

heater with electronic room temperature control plus week timer

product that is equipped with an electronic device, either integrated or external, that allows it to automatically vary its heat output over a certain time period, in relation to a certain required level of indoor heating comfort, and allows the setting of timing and temperature levels for a full week

Note 1 to entry: During the 7-day period, the settings must allow a variation on a day-to-day basis.

D.2.23

heater with room temperature control, with presence detection

product that is equipped with an electronic device, either integrated or external, that automatically reduces the set-point for the room temperature when no person is detected in the room

D.2.24

heater with room temperature control, with open window detection

product that is equipped with an electronic device, either integrated or external, that reduces the heat output when a window or door has been opened

Note 1 to entry: Whenever a sensor is used to detect the opening of a window or door, it can be installed with the product, externally to the product, built into the building structure or as a combination of those options.

D.2.25

distance control option

function that allows remote interaction from outside the building in which the product is installed with the control of the product

D.2.26

adaptive start control

function which predicts and initiates the optimal start of heating up in order to reach the set-point temperature at the desired time

D.2.27

working time limitation

function that automatically deactivates the product after a pre-set period of time

Note 1 to entry: The heater needs an active manual action or from external transmitted signal to be able to start with heating again.

D.2.28

black bulb sensor

product equipped with an electronic device, either integrated or external, that measures air and radiant temperature

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[IEC 62999:2016/AMD1:2021](https://standards.iteh.ai/catalog/standards/sist/66cc64f9-dfa2-40fc-aa29-7e0b98ca86c2/iec-62999-2016-amd1-2021)

D.2.29

intended for outdoor use

suitable for safe operation outside enclosed spaces, including possible use in outdoor conditions

<https://standards.iteh.ai/catalog/standards/sist/66cc64f9-dfa2-40fc-aa29-7e0b98ca86c2/iec-62999-2016-amd1-2021>

D.2.30

seasonal space heating energy efficiency

η_s

ratio between the space heating demand, supplied by a local space heater and the annual energy consumption required to meet this demand, expressed in %

Note 1 to entry: The seasonal space heating energy efficiency is calculated using the methods described in Annex III of regulation (EU) 2015/1188, taking into account the definitions and product categories in the standard.

D.2.31

period and duty cycle

fraction of one period in which the system is supplying power to the heating element

Note 1 to entry: Duty cycle is expressed as % of a period; a period is the time it takes for a system to complete a full cycle; a period (or full cycle) duration is expressed in the term of min; for electric heaters a period is an active mode to perform the intended function of a stream of heat accommodated to the varying demand; period duration could be initiated by an internal clock function integrated in the control device or given by the influence of ambient temperature and heat demand.

D.2.32

transitional period

lapse of time between the initiation of a defined temperature level and the actual achievement of the temperature level

Note 1 to entry: Typical transition periods of indefinite duration occur when the heat demand change from comfort to setback and setback to comfort levels. Additional heat load to the room, not initiated by the heater, could also trigger a transitional period of indefinite duration.

D.3 Requirements to comply with functions according to Commission Regulation (EU) 2015/1188

D.3.1 General

Functions implemented in electronic controls which are used identically in a family of heaters have to be tested only for one member of the family.

D.3.2 Product equipped with single stage heat output, no room temperature control

To check the single stage heat output function, switch the control to ON position and check that the appliance power is equal to the rating plate information. Test all possible positions of the controls to verify that no other functions are available.

D.3.3 Product equipped with two or more manual stages, no room temperature control

To check for two or more manual stages function, switch the control to the alternative power positions and check that the appliance power stages are equal to the rating plate or user instruction information. Test all possible positions of the controls to verify that no other functions are available.

D.3.4 Product equipped with mechanical room temperature control

To check for mechanical room temperature control function, in a room with stable temperature (in the range $23\text{ °C} \pm 3\text{ °C}$) the appliance should be allowed to adapt to the temperature for ≥ 60 min with the appliance switched OFF. Then switch the appliance ON and with the control check that the heat output is turned ON and OFF by the mechanical thermostat room temperature control. The room temperature control should switch the heat output ON and OFF at temperatures either side of the indicated room temperature set point. To verify the term “mechanical” the room temperature control should not depend on any active electronic components to be able to operate. (Typical mechanical room temperature control types would be bimetal/capillary-gas/oil/wax.)

D.3.5 Product equipped with electronic room temperature control

To check for **electronic room temperature control** function – in a room with stable temperature (in the range $23\text{ °C} \pm 3\text{ °C}$) the appliance should be allowed to adapt to the temperature for ≥ 60 min with the appliance switched OFF. Then switch the appliance ON and with the control check that the heat output is turned ON and OFF by the electronic room temperature control. The room temperature control should switch the heat output ON and OFF at temperatures either side of the indicated room temperature setpoint. To verify the term “electronic” the room temperature control should use active electronic components to be able to operate. It will only operate by external power supply, battery or from the mains supply. (Typical types would be microprocessor controlled thermostats with triac/relay to switch power ON/OFF.)

D.3.6 Product equipped with electronic room temperature control plus day timer

To check for **electronic room temperature control** function – see D.3.5. To check for day timer function – start the test period with the heater in a room where there shall be a continuous heat demand during the comfort period of $\geq 40\%$ of nominal heat output. The appliance should be tested for 2×24 h cycle. The device should be programmed according to the user instruction for one or two setback, frost protection or other state of reduced heat output periods over a 24 h period. The setback, frost protection or other state of reduced heat output period duration should be 5 h and 7 h and the comfort period a minimum of 4 h. Comfort temperature setpoint should be in the range $23\text{ °C} \pm 5\text{ °C}$. Setback temperature setpoint in the range $4\text{ K} \pm 1\text{ K}$ lower to the comfort temperature. The comfort/setback, frost protection or other state of reduced heat output periods should be registered with a sampling frequency of ≤ 2 min. The room temperature should be registered with a resolution of $\leq 0,5\text{ °C}$ – sampling frequency ≤ 2 min. The documentation should state that the room temperature is reduced according to the

programmed values during the setback or other state of reduced heat output periods compared to the comfort periods. Temperature control accuracy is not part of the verification.

D.3.7 Product equipped with electronic room temperature control plus week timer

To check for **electronic room temperature control** function, see D.3.5. To check for **week timer** function – start the test period with the heater in a room where there shall be a continuously heat demand during the comfort period of ≥ 40 % of nominal heat output. The week timer function should be tested for 7×24 h cycle. The device should be programmed according to the user instruction for one or two setback, frost protection or other state of reduced heat output periods over one 24 h period. The setback, frost protection or other state of reduced heat output period duration should be between 5 h and 7 h and the comfort period a minimum of 4 h. Comfort temperature setpoint should be in the range $23 \text{ °C} \pm 5 \text{ °C}$. Setback temperature setpoint in the range $4 \text{ K} \pm 1 \text{ K}$ lower to the comfort temperature. The comfort/setback, frost protection or other state of reduced heat output periods should be registered with a sampling frequency of ≤ 2 min. The room temperature should be registered with a resolution of $\leq 0,5 \text{ °C}$ -sampling frequency ≤ 2 min. The documentation should state that the room temperature is reduced according to the programmed values during the setback, frost protection or other state of reduced heat output periods compared to the comfort periods. Temperature control accuracy is not part of the verification.

D.3.8 Product equipped with room temperature control, with presence detection

To check for **presence detection** function, the product should be facing an open space with no obstacles in front for 3 m or at the maximum distance stated by the manufacturer if less than 3 m. The product in normal operation with no persons in the room should be in setback, frost protection or other state of reduced heat output. Test presence mode by a person height ≥ 150 cm dressed in clothing with a value in the range of one clo (see ASHRAE) walking back and forth at a distance of 3 m from the front of the product to 3 m in both directions from the centre of the products for 1 min. The product should then operate in comfort mode. After the person leaves the room the heater should revert to the setback, frost protection or other state of reduced heat output as defined by the manufacturer.

D.3.9 Product equipped with room temperature control, with open window detection

To check for **open window detection** function, the three following options are available:

a) Test by mechanical/optical open window detection

Test according to user instruction/documentation. Control for the selected setback temperature to be activated by mechanical or optical means to simulate the open window. The reduction level should be adjusted to setback temperature, frost protection or other state of reduced heat output. The function shall be able to be cancelled manually.

b) Test by thermal open window detection

The appliance to be tested should be running in comfort mode in a surrounding where the appliance room temperature control is set to $23 \text{ °C} \pm 3 \text{ °C}$ (comfort temperature, C_t) until stable conditions are achieved. The test can be performed in any enclosure / room / cabinet where the temperature is controlled by the room temperature control. The temperature registered as " C_t " should be measured as close to the temperature sensor as possible.

To test the open window function, reduce the ambient temperature between 5 K and 10 K below C_t within 10 min and maintain this reduced temperature for at least 30 min. This could be achieved by moving the **heater** from one room/enclosure/cabinet with the room temperature controller controlling the comfort temperature C_t to another room/enclosure/cabinet with a temperature between 5 °C and 10 °C below C_t . The appliance should stay in the cooler room/enclosure/cabinet for at least 30 min. Within 30 min the open window detection should turn the appliance to a reduced heat output. The duration of this state of reduced heat output should be minimum 60 min. The function is allowed to be cancelled manually.

The C_t temperature, the following reduced temperature and the heat output should be recorded throughout the test duration to verify that the conditions are according to the criteria.

c) Test by thermal open window detection (in a climatic test room)

The test is operated in the climatic test room A or B (Annex E).

The two air ventilation inlets located at the centre over the window are blocked.

The two air ventilation inlets located at the extreme positions over the window are replaced by ventilation ducts of a cross section from 55 mm × 220 mm going down along the window to its lowest part. The cold climate temperature T_F is $-5\text{ °C} \pm 0,5\text{ °C}$.

The temperature set point of the heater is 19 °C.

At the beginning of the test, the air exchange rate is of 0 volume/h. The heater is in comfort mode. The heater is installed according to the installation specifications (horizontal heaters below the window, vertical heaters on the wall next to the window) until the climatic conditions are stabilized in the room. The simulation of an opened window is achieved by stepping up the air exchange rate from 0 volume/h to 4 volumes/h.

The opened window detection is effective if within 15 min the heater goes into setback, frost protection or other state of reduced heat output mode. The function is allowed to be cancelled manually.

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D.3.10 Product equipped with distance control option (standards.itih.ai)

Test the **distance control** function according to user instruction/documentation. The function should allow for changing the settings or operation mode.

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The function of the distance control can be verified by checking the changes with the display indications – if a display is available. If no display is available, at least one function shall be verified by test, e.g. the change to setback function as in D.3.6 or D.3.7.

D.3.11 Product equipped with adaptive start control

Test the function adaptive start control according to user instruction/documentation. The function is tested in a room with the heater thermostat working between 50 % and 60 % Duty Cycle during periods of comfort. Comfort temperature is set to $23\text{ °C} \pm 3\text{ °C}$ until stable conditions are achieved. This temperature is the reference comfort temperature C_t .

Activate a setback period of 7 $-2/+0$ h per 24 h with a setback of $4\text{ °C} \pm 1\text{ °C}$. The comfort period being 17 $+2/-0$ h. With the adaptive start control activated – let the heater room temperature controller work during 7 × 24 h periods of comfort and setback cycles. After the latest setback period is finished, the comfort temperature C_t should be reached within ± 45 min deviation to the time target – with a maximal difference of ± 1 K from the reference comfort temperature, C_t . If the target temperature above is reached before the 7 days, the test can be stopped. The temperature should be registered with a sampling frequency of ≤ 2 min.

D.3.12 Product equipped with working time limitation

Test the **working time limitation** function according to user instruction/documentation. The function is tested by activating the product and measure the duration of time until the automatic deactivation.

D.3.13 Product equipped with black bulb sensor

The test for black bulb function is performed in a room with temperature of $20\text{ °C} \pm 4\text{ °C}$. The black bulb sensor should be positioned in the centre of the radiant heater beam at a distance