IEC 62947

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Electrically operated spray seats for household and similar use – Methods for measuring the performance – General test methods of spray seats

Sièges de toilettes électriques à pulvérisation d'eau pour usages domestiques et analogues – Méthodes de mesure de l'aptitude à la fonction – Méthodes d'essai générales des sièges de toilettes à pulvérisation d'eau

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

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

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICALLY OPERATED SPRAY SEATS FOR HOUSEHOLD AND SIMILAR USE – METHODS FOR MEASURING THE PERFORMANCE – GENERAL TEST METHODS OF SPRAY SEATS

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

Draft	Report on voting
59L/210/CDV	59L/216/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.

In this standard, the following print types are used:

– **terms defined in Clause 3: in bold type**.

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.

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INTRODUCTION

In recent years, spray toilet seats (hereinafter **spray seats**) have been used in various places, including households and public facilities.

The International Standard currently available for these products is IEC 60335-2-84, which covers the aspects of electrical safety.

This document covers the aspects of performance and specifies the general test methods for the evaluation of the performance of **spray seats**, including the test methods using substitutes of human faeces that take into consideration the large variety of human faeces substitutes, based on the fact that they are different in terms of composition, and the health condition of the user and their sitting style can have an influence on the overall performance.

ELECTRICALLY OPERATED SPRAY SEATS FOR HOUSEHOLD AND SIMILAR USE – METHODS FOR MEASURING THE PERFORMANCE – GENERAL TEST METHODS OF SPRAY SEATS

1 Scope

This International Standard specifies test methods to measure the performance of electrically operated **spray seats** for household and similar use.

This document applies to **spray seats**, including tank-type **spray seats**, instantaneous-type **spray seats** and combination-type **spray seats**.

This document does not apply to the electrically operated **spray seats** that are intended for medical and/or assistive functions

NOTE This International Standard does not specify acoustical noise requirements for electrical **spray seats**. Acoustical noise measurements are specified in IEC 60704-1 and the IEC 60704-2 series.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60335-2-84:2019, *Household and similar electrical appliances – Safety – Part 2-84: Particular requirements for toilet appliances*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
spray seat
toilet seat fitted with a device that emits water to the intimate area of the human body

Note 1 to entry: **Spray seats** can have functions such as heating the seat, blowing warm air, deodorizing or automatically opening/closing the seat and the bowl cover.

3.2
spray receiving point
point where the centre of the spray crosses the horizontal plane of the toilet bowl rim when the nozzle is in its middle position.

3.3
rear spray
spray emitted to the anal area

3.4
oscillating spray function
spray emitted by moving the spray point around the initial point

3.5
pulsating spray function
spray emitted from the nozzle, with changing **spray pressure** at regular time intervals

3.6
warm air blower
device that blows, by an electrical heating element and fan, warm air around the wet area of the body

3.7
rated spray angle
spray angle indicated by the manufacturer or defined by construction, which refers to the angle between the horizontal plane and the centre of the spray

3.8
spray pressure
spray intensity perceived by the user, which does not correlate exactly with the physical pressure value

4 General test conditions

4.1 General

The spray to be tested shall be the **rear spray**, not the front spray, unless otherwise specified.

The spray temperature setting shall be the maximum settable position of the heating function, unless otherwise specified.

When the spray temperature setting needs to be set to minimum for the test, it shall be the minimum settable temperature position (this may be unheated water).

When the spray temperature setting needs to be set to medium for the test, it shall be at the middle position of the temperature setting.

The pressure setting shall be the maximum settable position of **spray pressure**.

When the **spray pressure** setting needs to be set to minimum for the test, it shall be the minimum settable **spray pressure** position at which the spray reaches the **spray receiving point**.

4.2 Ambient conditions

The tests are carried out in a draught-free location at an ambient temperature of 20 °C ± 5 °C, unless otherwise specified. The temperature measuring point shall be 1 m above the forefront tip of the toilet bowl rim.

For the warm air blowing feature measurements, the ambient temperature shall be 20 °C ± 1 °C and relative humidity shall be adjusted to 50 % ± 5 %. When measuring warm air temperature, relative humidity adjustment may be omitted.

Annex D is applicable for **spray seats** designed to operate at low ambient temperature, i.e. 5 °C ±1 °C.

4.3 Electric supply

The supply voltage to each **spray seat** shall be maintained at the rated voltage ±2 % throughout the test.

If the appliance has two or more rated voltages, or a range of rated voltages and multiple frequencies, tests shall be conducted at the voltage and frequency used in the country of sale. The tested voltage and frequency shall be recorded.

4.4 Water supply

The water temperature shall be 15 °C ± 2 °C, unless otherwise specified.

The gauge pressure of the laboratory supply water at the inlet to each **spray seat** shall be maintained at (200 ± 20) kPa throughout the test.

The gauge pressure measurement shall be carried out under the condition that water is drained at a flow rate of 20 l/min from the water supply connection without the **spray seat** connected.

4.5 Parameter, unit and minimum measuring accuracy of instruments

The characteristics of the measuring instruments shall be in accordance with Table 1.

Table 1 – Requirements for measurements

Parameter	Unit	Minimum resolution	Instrument range of accuracy
Temperature	°C	0,1 °C	±0,5 K
Mass	g	0,1 g	±2 %
Pressure	kPa	1 kPa	±5 %
Force	N	1mN	±6 %
Time	s	1 s	±1 %
Air Velocity	m/s	0 to 9,99: 0,01m/s 10 to 30: 0,1 m/s	±2 % on indicated or 0,015 m/s, whichever is bigger
Electrical energy	Wh	0,1 Wh	±1 %
Linear dimensions	mm	Up to 1 mm 1 mm up to 25 mm 25 mm and above	±0,05 mm, ±0,1 mm, ±0,5 %

5 Spray performance

5.1 Spray temperature value, stability, reaction time and warm water duration

5.1.1 Setup

The **spray seat** shall be switched on and kept on for at least 60 min to allow the temperature of the **spray seat** to reach a stable state at ambient temperature.

The spray temperature is the temperature of the water measured at the **spray receiving point**. For this measurement, select a spray receiver as shown in Annex B.

The spray temperature shall be measured by the thermocouple attached to the jig shown in Annex B. The tip of thermocouple shall not touch any other materials during the measurement.

5.1.2 Measurement method

The measurement shall be conducted as follows (see Figure 1):

Allow **spray seat** to stabilize for 60 min for the first test and for 15 min between each test in the series.

Start recording the measurements, wait for 60 s and open the lid fully.

Wait for 15 s (at 75 s after the start of the measurement) and activate the seating detection sensor.

Wait for 60 s (at 135 s after the start of the measurement) and turn on the spray operation.

The spray operation shall be stopped automatically before 120 s or manually after 120 s (at 255 s after the start of the measurement)

Stop recording the measurements.

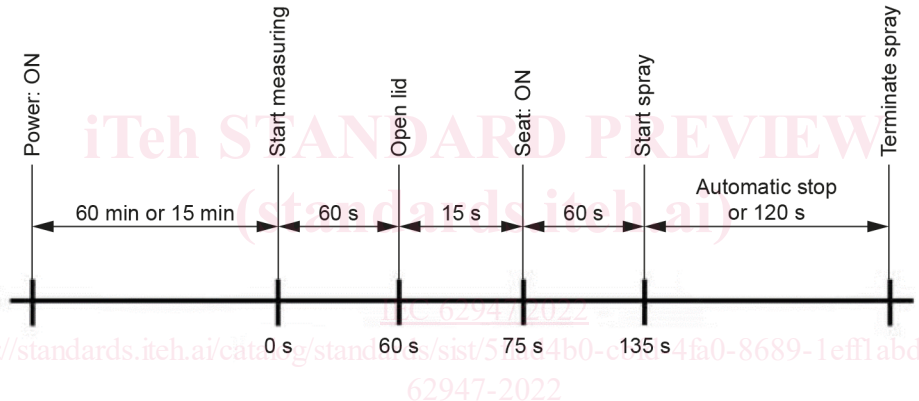

Figure 1 – Operation during spray temperature measurement

To eliminate measuring tolerance due to transient characteristics immediately after the start of spray, the first 5 s of spray shall be disregarded.

Calculations of time value (t) shall be as follows:

- t_0 = time when spray temperature reaches the thermocouple
- t_n = time n s after t_0
- t_{range} = range of 10 s used to evaluate temperature value
- t_{mid} = time in the middle of t_{range}
- t_x = time when spray temperature measurement is terminated
- t_{3Ka} = time after t_0 to reach T_{3K}
- t_{3Kb} = time after t_0 to reach T_{3K}after T_{range}
- T_{range}= average temperature value during t_{range}
- T_{3K} = temperature value (T_{range}) − 3 °C

When the spray emission is active 30 s or more, the average temperature value (T_{range}) shall be the average of the temperature from t_{10} to t_{20}, as shown in Figure 2.

When the spray emission is active less than 30 s, the temperature value (T_{range}) shall be the average of the temperature during 10 s in the middle of t_5 and t_x as shown in Figure 3.

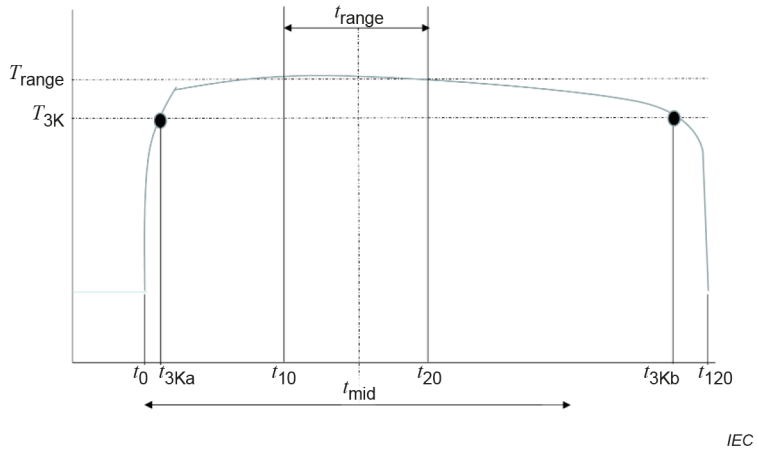

Figure 2 – Spray emission 30 s or more

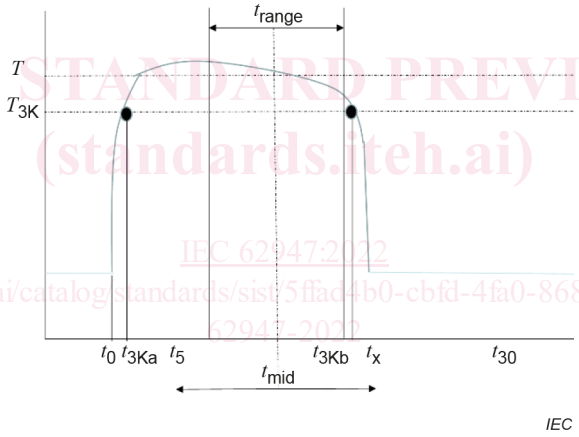

Figure 3 – Spray emission less than 30 s

5.1.3 Results

The temperature value (T_{range}) shall be the average temperature during t_{range}.

- T_{range} shall be (T_{max}+T_{min}) / 2.
- T_{max} shall be the maximum temperature during t_{range}.
- T_{min} shall be the minimum temperature during t_{range}.

Deviation shall be the difference between, for example, the value specified in the manual/technical specification (if provided in °C or °F) and the calculated temperature value T_{range}. Record the temperature according to the control panel or as specified in the manual and temperature value T_{range} as the outcome of the measurement.

Reaction time (t_{3Ka}) shall be the time elapsed after t_0 to reach T_{3K}.

Warm water duration of spray shall be t_{3Kb} minus t_{3Ka} (refer to Figure 2).

5.2 Spray temperature stability under spray pressure change

5.2.1 Setup

For the performance of these tests, the appliance shall be setup and operated in accordance with 5.1.1.

5.2.2 Measurement method

The tests shall be conducted at the highest temperature setting.

The change in **spray pressure** shall be carried out within 1 s to clearly establish the stability of the spray water temperature.

Detect the adjustment time of the **spray pressure** by measuring the time of the pressure change of the water spray.

In order to measure spray temperature stability when changing from minimum to maximum **spray pressure**, use the minimum **spray pressure** as the initial **spray pressure** and the maximum **spray pressure** as the final **spray pressure**, as shown in Figure 4.

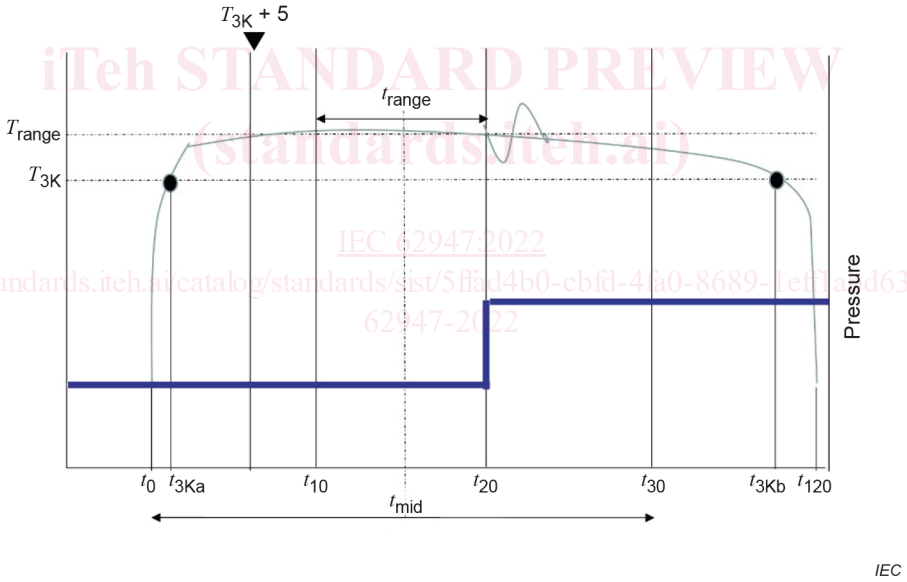

Figure 4 – Spray temperature-spray stability measurement method under spray pressure change, minimum to maximum

In order to measure spray temperature stability when changing from maximum to minimum **spray pressure**, use the maximum **spray pressure** as the initial **spray pressure** and the minimum s**pray pressure** as the final **spray pressure**, as shown in Figure 5.