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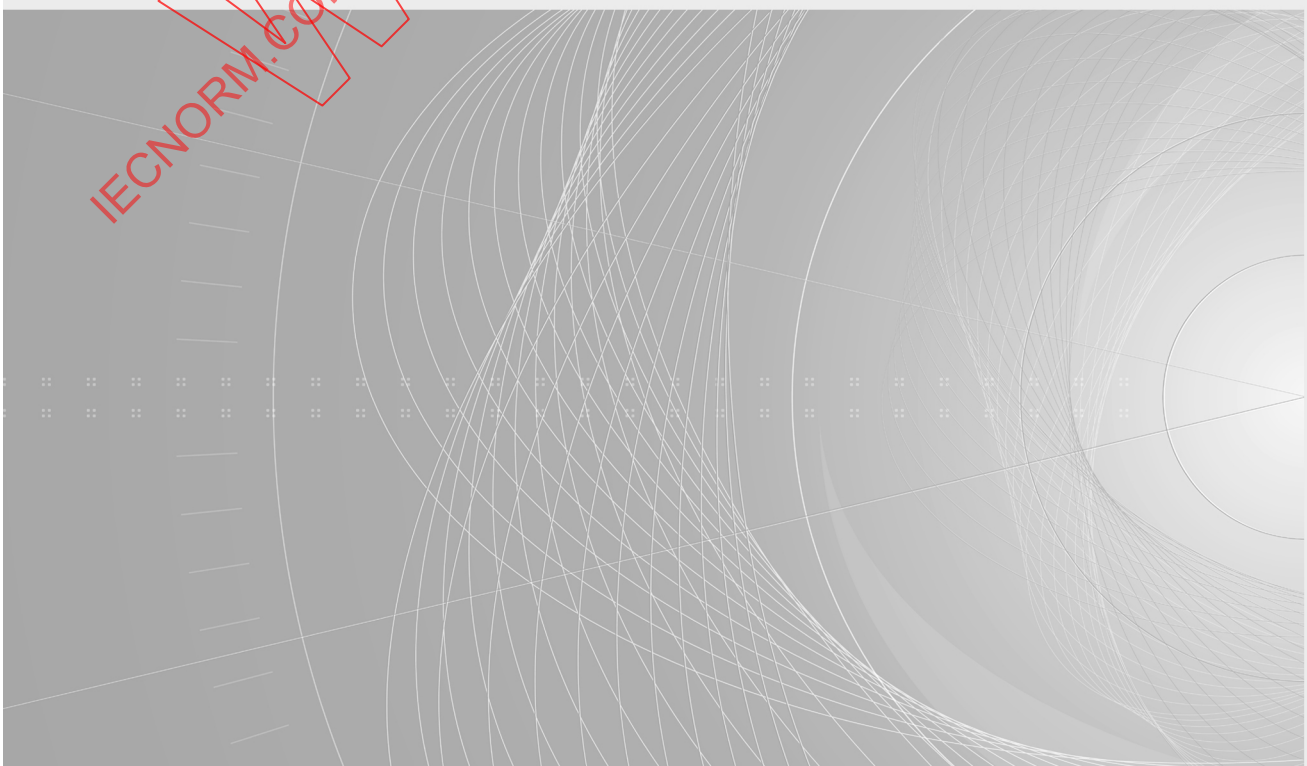
INTERNATIONAL STANDARD

AMENDMENT 2

Electric irons for household or similar use – Methods for measuring performance



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Electric irons for household or similar use – Methods for measuring performance

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE J

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FOREWORD

This amendment has been prepared by subcommittee 59L: Small household appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

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

FDIS	Report on voting
59L/67/FDIS	59L/68/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 maintenance result date indicated on the IEC web site 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- withdrawn,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.

3 Terms and definitions

3.13
auto switch-off device

Replace the definition by the following new definition:

device provided by the manufacturer to switch off the heating element if the iron is not moved for a stated period of time and not intended to activate a 'standby mode' or any kind of 'low power mode'

9 Measurements concerning steaming operation

Replace 9.1 and 9.2 (including any changes made in Amendment 1:2005) by the following new subclauses:

9.1 Measurement of heating-up time for steaming operation

9.1.1 For vented steam irons

All irons shall be given an initial preparation by steaming at least one reservoir capacity of water under dynamic conditions.

Weigh the empty iron (W_0) by means of a balance having an accuracy of at least ± 0,1 g.

For vented steam irons, the water reservoir is filled with distilled water having a temperature of 20 °C ± 2 °C up to the capacity specified by the manufacturer and then the iron is placed

on its stand or in its upright position. The thermostat is set to the maximum setting indicated for steam ironing.

For irons with a separate water reservoir, the reservoir is filled up to the capacity specified by the manufacturer.

Weigh the full iron (W_1).

The iron is then placed with the sole-plate in a horizontal position with a tolerance of ±1°on the carriage, as shown in Figure 4a. A container of known mass within ±0,1 g is placed under the sole-plate at a distance of approximately 200 mm in order to collect any water which may flow out of the iron during the test. In order to avoid condensing steam collecting in the container, a slow-running fan may be used to blow the steam away.

The iron is connected to the supply and immediately after the thermostat has switched off for the second time, the steam control is operated to give the maximum flow rate. If there is no signal lamp, the second opening of the thermostat is determined with a measuring apparatus.

The heating-up time is the time between the connection to the mains and the instant when the steaming flow appears under the soleplate.

The test is repeated but with the thermostat set to the minimum setting for steam ironing.

The heating-up time is expressed in seconds for both the maximum and minimum thermostat setting for steam ironing.

NOTE Some irons may need a preliminary preparation. In this case, before the test is carried out, the iron is prepared according to the instructions.

9.1.2 For pressurized steam irons or instantaneous steam irons

For pressurized steam irons or instantaneous steam irons, the boiler is filled with distilled water having a temperature of 20 °C ± 2 °C up to the rated capacity and then placed on its stand.

The thermostat of the iron is set to the maximum setting indicated for steam operation and, when applicable, any maximum temperature or pressure setting of the boiler.

The iron is connected to the supply and the following times t_1 and t_2 are recorded where

t_1 is the time necessary for the iron to reach the temperature rise of 160 K;

t_2 is the time necessary for the heating up process of the boiler.

The test is repeated, but with the thermostat of the iron set to the minimum setting indicated for steam operation and, if applicable, any minimum temperature or pressure setting.

The heating-up time is recorded, in minutes and seconds, for both the minimum and maximum thermostat setting for the steam ironing.

The heating-up time is recorded as the greater of the two values t_1 and t_2.

This measurement is not carried out on

- irons constructed so that steaming is irregular when the iron is in a rest position.

NOTE Some irons may need a preliminary preparation. In this case, before the test is carried out, the iron is prepared according to the instructions.

9.2 Measurement of steaming time, steaming rate and water leakage rate

9.2.1 For vented steam irons

For vented steam irons, without separate water reservoir, the test described in 9.1.1, at the maximum setting of the thermostat, is continued. At the end of heating up time, when steam appears under the soleplate, movements of the carriage for the steaming time (t) are started. The carriage is moved backwards and forwards in a direction parallel to the centre line of the soleplate over the distance of 500 mm. The reciprocal motion is produced by the transformation from rotary movement of 15 r.p.m. with reciprocal motion of 15 cycles per minute.

The duration of steaming time is 3 minutes. At the end of steaming time close the steam control to stop the steam. Weigh the iron (W_2).

The container referred to in 9.1.1 is weighed again and the mass of the water which has leaked from the iron without being evaporated is determined (W_3).

For cordless irons, appliances having a main supply attachment are tested as conventional irons. For appliances without a main supply attachment, dynamic steam rate is measured by sequences of 20 s without power supply. Between two sequences, the cordless iron is being reloaded on its stand. Repeat this cycle until 3 minutes of steaming have occurred.

The steaming rate S_R is calculated as follows:

$$S_R = \frac{W_1 - W_2 - W_3}{t}$$

where

W_1 *is the mass of the iron and water before the heating-up time;*

W_2 *is the mass of the iron and water after 3 minutes steaming;*

W_3 *is the mass of the water which has leaked without being evaporated.*

t *is the steaming time, in minutes.*

The water leakage rate L_R is calculated as follows:

$$L_R = \frac{W_3}{t}$$

The steaming rate and leakage rate are expressed in grams per minute.

The steaming time is the time when 90 % of the water has evaporated.

$$S_T = \frac{W_1 - W_0}{S_R} \times 0{,}9$$

where :

W_0 *is the mass of the empty iron*

0,9 is the 90 % of the water reservoir capacity

This time is stated in minutes and seconds.

9.2.2 For pressurized steam irons and instantaneous steam irons

For pressurized steam irons and instantaneous steam irons, the measurement procedure is carried out according to Figure 4b (see also Annex A).

The sole-plate shall be on a horizontal position ±1° and at the same level as the lower face of the reservoir.

A container is placed under the iron to receive the water which leaks without being evaporated.

The height between the container and the sole-plate shall be at least 500 mm ± 50 mm.

The test shall be done under the free steaming conditions.

Fill the empty reservoir or boiler/generator according to the manufacturer's instructions. The amount of water shall be noted: W_7

Turn on the iron, setting the thermostat at the maximum setting. The steaming regulator, if any, is set at the maximum setting.

Immediately after the steady conditions are reached, the steaming generation starts according to the following cycle:

- 5 s ON (the steam switch is turned on, there is steam generation);
- 15 s OFF (the steam switch is turned off, there is no steam generation).

This cycle is repeated until 12 times. Then the complete ironing system is weighed: W_4

Repeat the above-mentioned cycle 24 times and make the following measurements:

- the mass of the complete ironing system is measured: W_5;
- the mass of the water which has leaked without being evaporated is measured: W_6.

The steaming rate S_R *is calculated as follows:*

$$S_R = \frac{(W_4 - W_5) - W_6}{t}$$

Water leakage rate L_R *can be calculated as follows:*

$$L_R = \frac{W_6}{t}$$

The theoretical time of steaming generation T *is calculated as follows:*

$$T = \frac{W_7 \times \left(\frac{t_1}{t}\right)}{S_R + L_R}$$

where

W_4 *is the mass of the complete ironing system after the first 12 cycles, in grams;*

W_5 *is the mass of the complete ironing system after the following 24 cycles, in grams;*

W_6 *is the mass of the water that has leaked without being evaporated, in grams;*

W_7 *is the mass of the water poured into the reservoir or boiler/generator according to the manufacturer's instructions, in grams;*

S_R *is the steaming rate, in grams per minute;*

L_R *is the leakage rate, in grams per minute;*

T *is the theoretical time of steam generation, in minutes;*

t *is the steaming time, 24 × 5 s = 2 min;*

t_1 *is the total running time during the 24 cycles, 24 × 20 s = 8 min.*

14 Determination of total steaming time for hard water

Replace Clause 14 (including any changes made in Amendment 1:2005) by the following new Clause:

14 Determination of total steaming time for hard water

14.1 For non-pressurised steam irons

The following test is carried out unless the manufacturer recommends the use of distilled or demineralised or similar water.

This test is not carried out on cordless irons.

The iron is supported in an apparatus such as that shown in Figure 15 so that the sole-plate is in the horizontal position in still air and is moved backwards and forwards in a direction parallel to the centre-line of the sole-plate over the distance of 500 mm at a speed of approximately 0,4 m/s. The reciprocal motion is produced by the transformation from rotary motion of 15 r.p.m. with reciprocal motion of 15 cycles per minute. After 5 cycles (20 s) the movement is stopped and the iron is placed in the upright position as quickly as possible for a period of 10 s, after which the iron is returned to the horizontal position and the movement restarted. This procedure is repeated continuously.

NOTE 1 If the manufacturer recommends a different resting position, this position is used.

The water reservoir is filled with hard water to the capacity specified by the manufacturer.

The hard water has a hardness of 3 (300×10^{-6}) mmol/l prepared by method A as specified in IEC 60734. As an alternative, method C can be used if the chloride content is below 35,5 mg/l.

The iron is connected to the supply with the thermostat set to the maximum setting indicated for steam ironing. When the thermostat, if any, has switched off for the second time, the steam control is operated to give the maximum flow rate and the reciprocating movement started.

When the emission of steam ceases and when the iron is in an upright position, the steam control is closed and the water reservoir refilled with water as before. After 2 h of operation including 10 s rest times in the upright position, the iron is switched off for at least 1 h in order to cool. During this period, the iron is kept in the upright position with the steam control closed, any remaining water in the reservoir having been emptied away.

The above procedure is repeated continuously, the steaming rate S_R and water leakage rate L_R being measured according to 9.2 each time 5 l of water have been evaporated and introduced in a graph as a function of the quantity of water used. The test is continued until the steaming rate has dropped to 5 g/min or the water leakage rate has increased to 3 % of the steaming rate.

If the iron incorporates a descaling device, such as a means for providing a shot of steam, this cleaning procedure is carried out during the test according to the manufacturer's instructions.

The steaming time before descaling is the total time during the test when steam is emitted and is expressed in hours.

NOTE 2 The steaming time excludes the periods when the iron is in the 10 s rest time upright position and the cooling times.

After the test the iron is descaled according to the manufacturer's instructions and the steaming time, steaming rate and water leakage rate are measured according to 9.2 and recorded.

The above test is repeated for a sufficient number of times until the descaling procedure fails to improve the steaming rate higher than 5 g/min or the water leakage rate lower than 3 % of the steaming rate.

The total steaming time is the sum of the individual steaming times before descaling.

The results of the test are expressed as

– *the total steaming time, in hours;*
– *the quantity of water evaporated, in litres;*
– *the number of times the iron is filled.*

NOTE 3 The characteristics S_R and L_R for hard water are to be used for the determination of total steaming time for hard water, as indicated in Clause 13, but are not useful information for the consumer.

14.2 For pressurised steam irons or instantaneous steam irons

The following test is made, unless the manufacturer recommends the use of distilled or demineralized or similar water.

The iron is supported in an apparatus such as that shown in Figure 4b so that the sole-plate is in the horizontal position in still air.

The water reservoir or boiler is filled with hard water to the capacity specified by the manufacturer.

The hard water has a hardness of 3 (300×10^{-6}) mmol/l prepared by method A as specified in IEC 60734. As an alternative, method C can be used if the chloride content is below 35,5 mg/l.

The iron and boiler are connected to the supply with the thermostat of the iron set to the maximum setting indicated for steam operation and where applicable any maximum setting of the boiler.

Immediately after the steady conditions are reached, the steaming generation starts according to the following cycle:

- t_{on} = 5 s ON (the steam switch is turned on, there is steam generation);
- t_{off} =15 s OFF (the steam switch is turned off, there is no steam generation).

When the boiler is empty or water reservoir has been filled twice, the system is unplugged and rested to allow cooling to ambient temperature. If a water level indicator is present, then it should be used as criteria to determine whether the water reservoir or boiler is empty.

The above procedure is repeated continuously, the steaming rate S_R and water leakage rate L_R being measured according to 9.2 each time a maximum of 50 l of water has been evaporated. The test is continued until:

- *the steaming rate has dropped to 5 g/min, or*
- *the water leakage rate at the iron has increased to 3 % of the steaming rate, or*
- *significant damage or failure occurs, for example leakage, no steaming functioning, no heating etc., or*
- *500 l standard hard water has been evaporated.*

NOTE 1 500 l is considered to be approximately equivalent to 5 years of normal use. Any deviation should be reported.

If the system incorporates a descaling or rinsing device, this cleaning procedure is carried out during the test according to the manufacturer's instructions.

The total steaming time is the sum of the individual steaming times without considering descaling or rinsing times.

The results of the test are expressed as:

- *the total steaming time, in hours (Sum of t_{on});*
- *the total running time in hours, (Sum of t_{on} and t_{off});*
- *the quantity of water evaporated, in litres.*

NOTE 2 The characteristics S_R and L_R for hard water are to be used for the determination of total steaming time for hard water, as indicated in 9.2.2, but are not considered to be useful consumer information.

Figure 4 – Test apparatus

Replace Figure 4 by the following new figures:

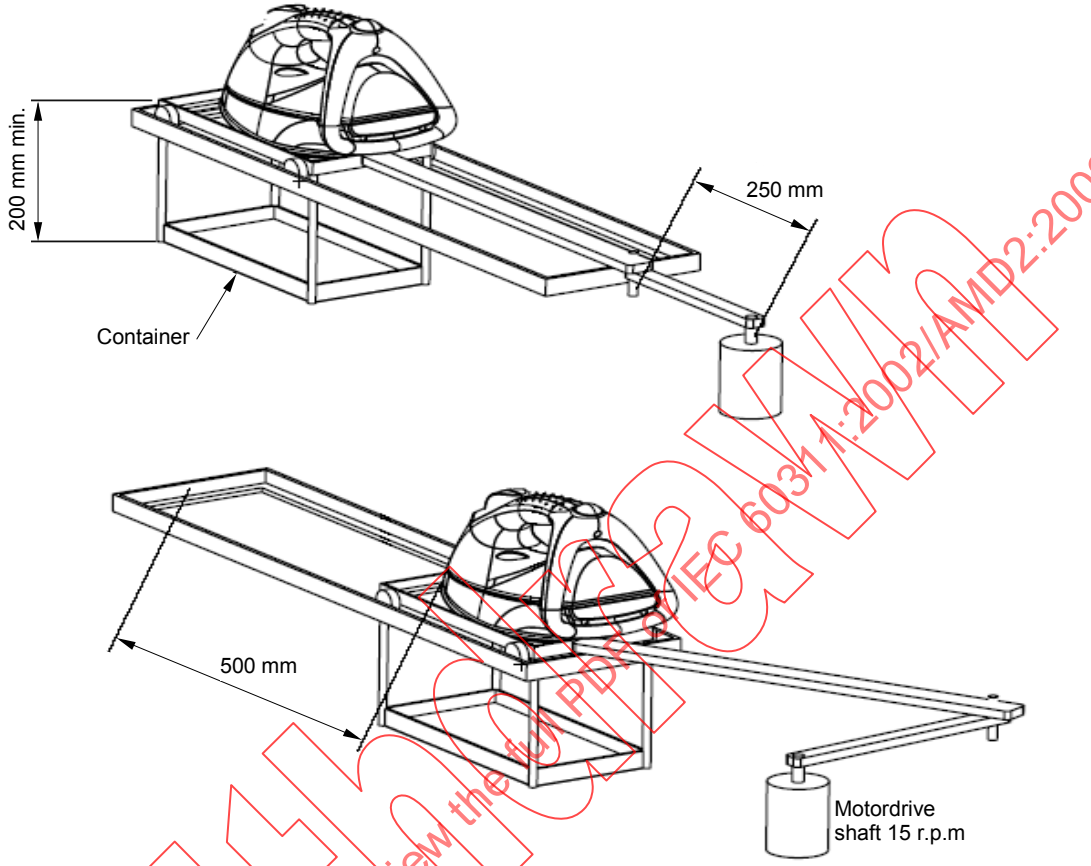

Figure 4a – Vented steam irons for steaming operation

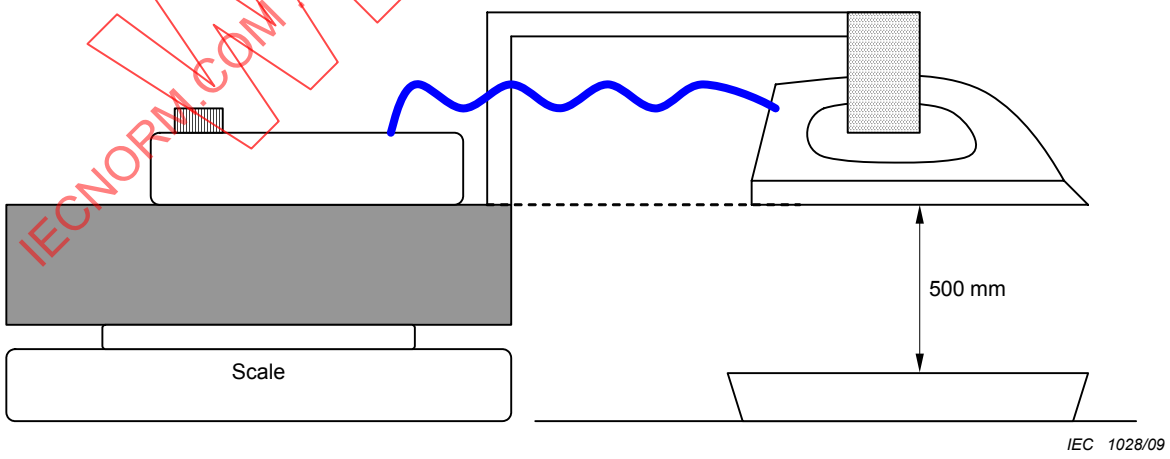

Figure 4b – Pressurized or instantaneous steam irons

Figure 4 – Test apparatus