SLOVENSKI STANDARD
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Electric shavers for household use - Methods for measuring the performance (IEC 1254:1993)

Electric shavers for household use - Methods for measuring the performance

Elektrische Haushalt-Rasierer Prüfverfahren zur Bestimmung der Gebrauchseigenschaften

Rasoirs électriques à usage domestique - Méthodes de mesure de l'aptitude à la fonction

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ENGLISH VERSION

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

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FOREWORD

The text of document 59(CO)33, as prepared by IEC Technical Committee 59: Performance of household electrical appliances, was submitted to the IEC-CENELEC parallel vote in July 1993.

The reference document was approved by CENELEC as EN 61254 on 8 March 1994.

NOTE: Sweden has no obligation to implement this European Standard.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1995-03-15

- latest date of withdrawal of conflicting national standards (dow) 1995-03-15

For products which have complied with the relevant national standard before 1995-03-15, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-03-15.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given only for information. In this standard, annexes A, B, C, and D are normative and annexes E and F are informative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 1254:1993 was approved by CENELEC as a European Standard without any modification.

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Rasoirs électriques à usage domestique –

Méthodes de mesure de l'aptitude à la fonction

Electric shavers for household use –

Methods for measuring the performance

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC SHAVERS FOR HOUSEHOLD USE –

Methods for measuring the performance

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 1254 has been prepared by IEC technical committee 59: Performance of household electrical appliances.

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

DIS	Report on voting
59(CO)33	59(CO)35

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

Annexes A, B, C and D form an integral part of this standard.

Annexes E and F are for information only.

INTRODUCTION

Determination of the performance characteristics of dry shavers is usually based on the subjective analysis of a test panel. The results of such a test programme may be affected by prolonged use of a certain type of shaver prior to test and subsequent use of a particular shaver system during a test. Intrusive advertising campaigns may have an influence as well.

In the test method of this standard such problems are largely overcome by taking the following measures:

a) Care is taken to ensure that different shaver systems (rotary and vibratory) are represented by equal numbers of shaver users.

b) To maintain the balance between the shaver systems throughout the entire test period, each tester uses his own shaver prior to using each test shaver.

c) Conclusions on differences between shavers are based on statistical analysis, taking into account possible user-effects (see point a).

NOTE - Whereas the performance data are assessed on a non-comparative basis, the results should be evaluated by comparison.

ELECTRIC SHAVERS FOR HOUSEHOLD USE –

Methods for measuring the performance

1 Scope

This International Standard states and defines the principal performance characteristics for men's electric shavers, which are of interest to the user, and describes standard methods for measuring these characteristics.

This standard is not concerned with safety or with performance requirements.

2 Definitions

2.1 **mains shaver:** Shaver which can be operated directly from the mains supply.

NOTE - The shaver may also be suitable for an additional power source.

2.2 **rechargeable shaver:** Shaver which is supplied by a rechargeable battery belonging to it.

NOTE - A rechargeable shaver may also be operated directly from the mains supply.

2.3 **battery shaver:** Shaver which is supplied by primary batteries.

2.4 **car shaver:** Shaver which is supplied by a car or boat battery.

2.5 **rotary shaver:** Shaver with round shaving head(s) and usually rotating cutters.

2.6 **vibratory shaver:** Shaver with linear shaving head(s) and usually vibrating cutters.

2.7 **trimmer:** Accessory incorporated in the shaver, to groom particular facial hair, e.g., moustache, beard or side whiskers.

3 List of measurements

Performance is determined by carrying out the following measurements:

- Overall dimensions (5.1).
- Mass (5.2).
- Length of the supply cord (5.3).
- Operation time per battery charge (6.1).
- Operation time per primary battery (for battery shavers only) (6.2).
- Shaving performance (clause 7).
- Trimmer performance (clause 8).
- Gravimetric analysis of the difference in closeness of shave (clause 9).

4 General conditions for measurements

Unless otherwise specified, the measurements are made under the following conditions:

- Ambient temperature: 20 °C ± 5 °C.
- Supply voltage: rated voltage.

5 Measuring methods for dimensions

5.1 *Overall dimensions*

The maximum overall dimensions of the shaver – height, length and width or diameter – are measured and indicated in millimetres. Any fixed projection on the appliance itself is taken into account, including control knobs and the cord guard of any supply cord. Movable parts such as the trimmer are in the closed position.

The overall dimensions of the storage case are also measured.

5.2 *Mass*

The mass of the shaver in use is measured and indicated in grams to the nearest five grams.

NOTE - "Shaver in use" means without protection cap but with batteries or supply cord, as appropriate.

5.3 *Length of the supply cord*

The distance between the entry points into the shaver and the plug, including any cord guard, is measured. Coiled cords are stretched with a pull of approximately 1 daN, and indicated in metres rounded down to the nearest 0,05 m.

6 Determination of the operation time per charge

6.1 *Operation time per battery charge*

After being fully charged and discharged, the batteries are fully charged according to the instructions for use. The shaver is operated for periods of 5 min, separated by intervals of 24 h. The test is terminated when the cell voltage drops below 1,05 V with the shaver running in free air. The operation time is expressed in minutes.

NOTE - The operation time resulting from this test procedure will be higher than the time resulting from practical use.

6.2 *Operation time per primary battery*

The shaver is operated as specified in 6.1 using new batteries. The test is terminated when the cell voltage drops to approximately 0,9 V with the shaver running in free air. The operation time is expressed in minutes.

NOTE - The operation time resulting from this test procedure will be higher than the time resulting from practical use.

7 Shaving performance

7.1 *Composition of the test panels*

Each panel is to be composed so that it is reasonably representative of the adult male population of the country in which the test is performed, particular attention being paid to hair density, rate of beard growth, toughness of the beard, sensitivity towards skin irritation, and the time taken to shave.

The members of the test panels should not be influenced by preconceived ideas.

Subpanels of equal size should be formed, each subpanel representing one of the two basic electric shaver systems:

- rotary type shaver users (ROTA panel);
- vibratory type shaver users (VIBRA panel).

For statistical reasons, the number t of testers in each of the above subpanels should be at least 12.

NOTES

1 Whereas some deviation of the test panel composition from the real situation in a country will not have a noticeable influence on the results, it is essential that subpanels have comparable compositions.

2 A subpanel composed of testers who use wetshavers (razor blades) may be considered.

7.2 *Test duration and test procedure*

7.2.1 *Test duration*

The test period is preceded by a two week introduction period in which the panel testers familiarize themselves with the other shaving system, i.e. rotary type shaver users shave with vibratory type shavers, and vibratory type shaver users shave with rotary type shavers.

The test period for each shaver, which should start within a week of the introduction period, has three shaving days. The first day of each period the tester uses his own shaver (see annex D).

NOTES

1 If a small number of shaver models are to be tested, the three days period can be extended to six days. On day 7 the testers use their own shaver (see annex D).

2 For panels with a low density of beard hairs or light beards, each test day may be preceded by a non-shaving day (see annex D).

7.2.2 *Test procedure*

Day 1

On the first shaving day each panel tester shaves with his own shaver, which is used as a reference. Questionnaire 1 (see annex A) is to be completed immediately after shaving, but only in the first two test periods.

NOTE - Questionnaire 1 is not included in the final analysis. It allows for the test institute to characterize the user-panels, particularly with respect to the average level of judgement scores.

Day 2 and Day 3

On the second and third shaving days the panel tester shaves with one of the test shavers. On both days he records the shaving time with a stopwatch, and immediately after shaving fills in questionnaire 2 (see annex A) relating to shaving time, closeness of shave, and skin comfort.

NOTE - Possible variations in the testing scheme are given in annex D.

7.2.3 *Handling, convenience and storage, etc.*

For each test period the handling, convenience and storage, etc. of the test shaver are assessed and questionnaire 3 is completed on the last day of the test period (see annex A).

The test is continued until each panel tester has tested each shaver once.

The instructions for panel testers is given in annex B.

7.3 *Distribution of the shavers*

The shavers are distributed so that each panel tester:

- shaves with each shaver in turn;
- uses each shaver an equal number of times (usually once).

The following should be observed as far as possible:

- For each panel tester, the sequence of distribution of the shavers should be different.

NOTE - This procedure avoids possible interaction between shavers.

- The first shaver to be tested shall not be the same as that used in the introduction period.
- If a particular shaving system (vibra or rota) is substantially under-represented, all shavers of that system should be tested sequentially.

NOTE - This procedure limits the influence of the over-representation of the other system.

- The number of each model of shaver should be as small as possible.

NOTE - Although each shaver is judged individually, the method proposed by Kraitchik (1953) can be used as an efficient tool to produce a distribution scheme. The method is illustrated by the example shown in annex C.

7.4 *Statistical analysis*

Using a 10 point scale, as shown in annex A, the results are analysed by using an analysis of variance.

The following sources of variation are included:

- variation due to subpanels p;
- variation due to users t (within subpanels p);
- variation due to shaver types n;
- variation due to the interaction $p \times n$;
- variation due to the interaction $t(p) \times n$;
- variation due to experimental error (residual variation).

As an example table 1 shows the sources of variation and the associated numbers of degrees of freedom (df) for the case $p = 2$, $t(p) = 18$, $n = 9$, k (number of the repetitions) = 2.

Table 1 – Sources of variation and associated number of degrees of freedom

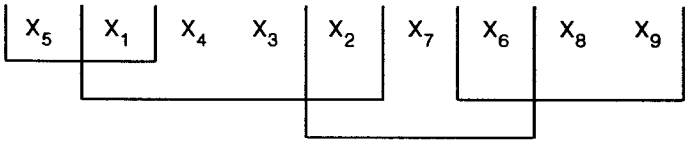
Source of variation	*df*
Grand mean	1
Subpanels p	1
Users (within panels) $t(p)$	34
Shaver types n	8
Interaction $p \times n$	8
Interaction $t(p) \times n$	272
Residual	324

The homogeneity of the shaver types can be assessed with an F-test. Given a significant difference between types, it is possible to establish clusters of types (see annex E).

7.5 *Final ranking*

If the statistical analysis shows a significant interaction between subpanels and shaver types ($p \times n$), results for each subpanel have to be presented separately.

For each result e.g. closeness on cheek, chin, under the nose (see annex A); the analysis leads to a result which can be shown schematically. An example for nine shavers, X_1 to X_9 is given below:



The horizontal bars below the characters X_5, X_1, etc., represent the results of the analysis of variance. Shaver types X_5 and X_1 form the first statistical group, showing that the difference between X_5 and X_1 does not differ significantly from zero. The second statistical group is formed by shavers X_1, X_4, X_3 and X_2, the third by X_2, X_7 and X_6 and the fourth by X_6, X_8 and X_9.

Differences in average scores should only be identified if the relevant shaver types belong to different statistical groups.

8 Trimmer performance

The evaluation of trimmer performance is included in questionnaire 3 (annex A).

9 Gravimetric analysis of the difference in closeness of shave

In this analysis the relative closeness of shave produced by different shaver types is determined by establishing the total yield of hair and skinflakes, and by applying mathematical treatment and statistical analysis of the data.

The method is of a differential nature, testers shaving one side of their face with a shaver of one particular type and the other side of their face with another. Thus, results always relate to differences in shaving quality rather than to absolute values. The gravimetric analysis has to be performed in a laboratory.

NOTE - References to a document giving extensive information related to the development and background of the method are given in annex F.

9.1 *Composition of the test panels*

Each panel is to be composed as specified in 7.1. The number of testers t in each subpanel shall be at least six but preferably 12.

9.2 *Test procedure and distribution scheme*

The method is based on test periods of four days, subdivided into two blocks of two days. On the day preceding the first test day, the testers shave at home as usual (see figure 1).

During the test period the testers shave until they consider themselves clean shaven.