IEC 61855

Edition 2.0 2022-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Household and similar use electrical hair care appliances – Methods for measuring the performance

Appareils électriques destinés aux soins des cheveux pour usages domestiques et analogues – Méthodes de mesure de l'aptitude à la fonction

IEC 61855:2022-08(en-fr)

AVA Documents
Document Sharing Hub

Full document details: IEC 61855 2022

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2022 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

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

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

AVA Documents
Document Sharing Hub

Full document details: IEC 61855 2022

IEC 61855

Edition 2.0 2022-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Household and similar use electrical hair care appliances – Methods for measuring the performance

Appareils électriques destinés aux soins des cheveux pour usages domestiques et analogues – Méthodes de mesure de l'aptitude à la fonction

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 97.170

ISBN 978-2-8322-4074-8

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

AVA Documents
Document Sharing Hub

Full document details: IEC 61855 2022

CONTENTS

FOREWORD 4
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 List of measurements and tests 7
4.1 General 7
4.2 General conditions for measurements 8
4.3 Test environment 8
4.4 Limits of voltage variation 8
4.5 Test voltage 8
4.6 Test frequency 8
4.7 Test electrical supply system 8
4.8 Steady conditions 8
4.9 Requirements for measurement instruments 9
5 Measurements 9
5.1 Mass of the appliance 9
5.2 Length of the flexible cord 9
5.3 Heating-up time 9
5.3.1 Hair dryer 9
5.3.2 Hair curler 9
5.3.3 Hair straightener 10
5.4 Temperatures 10
5.4.1 General 10
5.4.2 Hair dryer 10
5.4.3 Hairstyling appliances with warm air 11
5.4.4 Hair curler 12
5.4.5 Hair straightener 12
5.5 Air flow of the hair dryer 12
5.6 Drying rate of the hair dryer 13
5.6.1 General 13
5.6.2 Test equipment 13
5.6.3 Measuring procedure 14
5.6.4 Determination of the drying rate 15
5.7 Measurement of anion concentration of anion hair dryer 15
5.8 Measurement of tension of hair straightener 15
5.9 Drop endurance test 16
5.10 Service life test 16
5.10.1 Hair dryer 16
5.10.2 Hair curler 16
5.10.3 Hair straightener 17
5.11 Attachment of accessories 17
5.11.1 Reliability 17
5.11.2 Ease of handling 17
6 Measurement of airborne acoustical noise 17
7 Features 17
7.1 Control settings 17

AVA Documents
Document Sharing Hub
Full document details: IEC 61855 2022

7.2 Accessories 17
7.3 Additional features 17
8 Instructions for use 18
Annex A (informative) Additional information 28
A.1 Measurement of the volumising effect of diffusers (volumisers) 28
A.2 Measurement of hair intake 28
A.3 Information at the point of sale 28
A.4 List of accessories supplied 28
Annex B (informative) Addresses of suppliers 29
B.1 General 29
B.2 Test cloth for measuring drying rate of the hair dryer 29
B.3 Measurement of anion concentration 29
Bibliography 30

Figure 1 – Temperature measuring device (from UL 859) 19
Figure 2 – Attachment of the thermocouples (from UL859) 20
Figure 3 – Distance between the measuring device and the air outlet 21
Figure 4 – Example of graph of air outlet temperature distribution of hair dryer or hairstyling appliance with warm air 22
Figure 5 – Hair curler, position of the measuring points 22
Figure 6 – Example of temperature profile of the barrel of the hair curler 23
Figure 7 – Hair straighter, position of the measuring points 23
Figure 8 – Example of temperature profile of the heating plate of the hair straightener 23
Figure 9 – Test set-up for measuring the air flow of the hair dryer 24
Figure 10 – Test equipment for measuring the drying rate 25
Figure 11 – Graphical derivation of distance D_d 26
Figure 12 – Measurement setup of anion emission concentration 26
Figure 13 – Test setup for measuring tension 27
Figure 14 – Example of indication of tension uniformity 27

Table 1 – Requirements for measurement instruments 9

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR USE ELECTRICAL HAIR CARE APPLIANCES – METHODS FOR MEASURING THE PERFORMANCE

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61855 has been prepared by subcommittee 59L: Small household appliances, of IEC technical committee 59: Performance of household and similar electrical appliances. It is an International Standard.

This second edition cancels and replaces the first edition published in 2003. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the definitions of hair dryers, hair curlers and hair straighteners are updated;
b) the measurement of temperature profile of the outlet air of hair dryers is added;
c) the measurement of temperature profile of the whole work area of hair curlers is added;
d) the measurement of temperature profile of the heating plate of hair straighteners is added;
e) the measurement method for air flow of hair dryers is introduced;
f) the measurement method for anion emission concentration of anion hair dryers is introduced;

AVA Documents
Document Sharing Hub

Full document details: IEC 61855 2022

g) the measurement method for tension of hair straighteners is introduced;

h) the service life test for hair dryers, hair curlers and hair straighteners is introduced.

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

Draft	Report on voting
59L/215/FDIS	59L/218/RVD

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.

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.

In this document, the following print types are used:

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

HOUSEHOLD AND SIMILAR USE ELECTRICAL HAIR CARE APPLIANCES – METHODS FOR MEASURING THE PERFORMANCE

1 Scope

This document applies to electrical appliances for household and similar use for drying and styling hair (including their accessories).

This document defines the main performance characteristics that are of interest to the user and specifies methods of measuring these characteristics.

NOTE 1 Appliances to which this document applies include:

– **Hair dryers**;
– **Hair curlers**;
– **Hair straighteners**.

This document does not specify the requirements for performance.

This document does not deal with safety requirements (IEC 60335-2-23).

This document does not apply to electric hair clippers or trimmers.

NOTE 2 See IEC 62863 for the method of measuring the performance of electric hair clippers or trimmers for household use.

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 60704-2-9, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-9: Particular requirements for electrical hair care appliances*

ISO 2267:1986, *Surface active agents – Evaluation of certain effects of laundering – Methods of preparation and use of unsoiled cotton control cloth*

3 Terms and definitions

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

ISO and IEC maintain terminological 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
hair dryer
appliance that applies electric energy to dry the hair by cool or warm air flow

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

3.1.1
portable hair dryer
hair dryer intended to be moved during normal use

3.1.2
anion hair dryer
hair dryer capable of releasing anion particles in normal use

3.2
hairstyling appliance
electric appliance in which heat is produced for styling the hair

3.2.1
hair curler
hairstyling appliance which is able to curl the hair

3.2.2
hair straightener
hairstyling appliance which is able to straighten the hair

3.3
concentrator
accessory used to concentrate the air flow in one direction

3.4
diffuser
volumiser
accessory for providing a wide distribution of the air flow

3.5
rated voltage
voltage assigned to the appliance by the manufacturer

3.6
rated voltage range
voltage range assigned to the appliance by the manufacturer

3.7
rated frequency
frequency assigned to the appliance by the manufacturer

3.8
rated frequency range
frequency range assigned to the appliance by the manufacturer

4 List of measurements and tests

4.1 General

Depending on the appliance, the following measurements or tests are relevant when assessing the performance:

– mass, in accordance with 5.1;
– length of the flexible cord, in accordance with 5.2;
– heating-up time, in accordance with 5.3;
– temperatures, in accordance with 5.4;

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

– air flow, in accordance with 5.5;
– drying rate, in accordance with 5.6;
– anion concentration of **anion hair dryer**, in accordance with 5.7;
– tension of **hair straightener**, in accordance with 5.8;
– drop endurance test, in accordance with 5.9;
– service life test, in accordance with 5.10;
– attachment of accessories, in accordance with 5.11;
– airborne acoustical noise, in accordance with Clause 6;
– features, in accordance with Clause 7;
– instructions for use, in accordance with Clause 8.

NOTE For other items, see Annex A for additional information.

4.2 General conditions for measurements

Unless otherwise specified, the measurements are carried out under the conditions of 4.2 to 4.9.

The measurements are made with controls adjusted to their highest setting and when steady conditions in accordance with 4.8 are established.

NOTE 1 Due to the influence of environmental conditions, variations in time, origin of test materials and proficiency of the operator, most of the described test methods will give more reliable results when applied for comparative testing of a number of appliances at the same time, in the same laboratory, and by the same operator.

4.3 Test environment

The tests are carried out in a substantially draught-free room. The ambient temperature is maintained at (23 ± 2) °C. The relative humidity is maintained at 50 % ± 5 %.

4.4 Limits of voltage variation

During the test, the variation in the voltage shall not exceed ±1 % of the test voltage.

4.5 Test voltage

Unless otherwise specified, the tests are carried out at a specific voltage within a **rated voltage range** (e.g.100 V to 240 V) or at the **rated voltage** or voltages (e.g. 120 V, or 120 V and 240 V).

4.6 Test frequency

The appliances are tested at the **rated frequency** or within a **rated frequency range** (e.g. rated as 50 Hz and 60 Hz, or 50 Hz to 60 Hz).

4.7 Test electrical supply system

Total harmonic distortion of the test electrical supply system shall be less than 5 %.

4.8 Steady conditions

For **hair dryers**, steady conditions are considered to be established 10 min after switching on the appliance.

For other appliances, steady conditions are considered to be established 20 min after switching on the appliance or when the thermostat has operated four times, if this occurs first.

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

4.9 Requirements for measurement instruments

The requirements for measurement instruments shall be in accordance with Table 1.

Table 1 – Requirements for measurement instruments

Parameter	Unit	Minimum resolution	Instrument accuracy
Temperature	°C	0,1 °C	±0,5 K
Mass	g	0,1 g	±2 %
Time	s	1 s	±1 %
Air flow	m/s	0 to 9.99: 0.01 m/s 10 to 30:0.1 m/s	± 2% on indicated or 0.015 m/s, whichever is bigger
Electrical energy	W·h		±1 %
Anion concentration	ion/cm^3	10 ion/cm^3	±10 %
Tension	N	0,01 N	±0,5 %

The thermocouples shall be type K, Ni-CrSi.

5 Measurements

5.1 Mass of the appliance

The mass of the appliance is determined including the flexible cord, but excluding any accessory.

The mass of each accessory is measured separately.

The results are expressed in kg to the nearest 0,01 kg.

5.2 Length of the flexible cord

The length of the flexible cord is measured between the point where the cord or cord guard enters the appliance and the cord entry point of the plug. Coiled cords are stretched with a pull of 10 N before measurement.

The length is expressed in m rounded down to the nearest 0,05 m.

5.3 Heating-up time

5.3.1 Hair dryer

Not applicable.

5.3.2 Hair curler

The heating-up time of the **hair curler** is the time taken for the temperature rise of the barrel to reach 100 K, measured in accordance with 5.4.4.1. The time is expressed in s.

NOTE This temperature rise implies a temperature of approximately 120 °C, which is considered to be the minimum temperature necessary for curling dry hair.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

5.3.3 Hair straightener

The heating-up time of the **hair straightener** is the time taken for the temperature rise of the heating plate to reach 100 K, measured in accordance with 5.4.5.1. The time is expressed in s.

NOTE This temperature rise implies a temperature of approximately 120 °C, which is considered to be the minimum temperature necessary for straightening dry hair.

5.4 Temperatures

5.4.1 General

The test methods, which are considered to be reproducible, are only applicable for comparative testing.

5.4.2 Hair dryer

5.4.2.1 Outlet air temperature of hair dryers

The measuring device is shown in Figure 1.

The thermocouple grid assembly shall consist of two pieces of 1,6 mm thick glass epoxy board with the configuration and dimensions shown in Figure 1. The two boards are to be separated by 3,2 mm by one 134 mm × 6,4 mm × 3,2 mm wood spacer at the top and bottom edges. Each spacer is to be secured by four M3 × 12mm countersunk flat head machine screws, so that each screw's head is the same level with the front plate. Each end screw is to be threaded from the face of the assembly into a nut against the rear epoxy board. Each of the middle screws is to be located approximately 38 mm from the nearest longer edge of the board and threaded from the face into a standoff leg of a sheet aluminium back plate. The 140 mm by 83 mm stand-off back plate is to consist of sheet aluminium that is 1,3 mm thick, having a minimum 11 mm wide integral standoff leg formed at each corner by means of an extension of the metal being bent in two successive 90° angles to cause the back plate to stand away from the rear epoxy board at 6,5 mm. The back plate is to be secured to the centre of the 140 mm × 83 mm section of the board. The board assembly is to be provided with 53 thermocouples. The thermocouples are to be located on the grid spaced as shown in Figure 1. The thermocouples are to be passed through the two thicknesses of glass epoxy board, and the thermocouple junction is to be cemented to the face of the board using epoxy cement, as shown in Figure 2.

Controls are adjusted to obtain the highest outlet air temperature.

The temperature is measured within 30 s after steady conditions have been reached, in accordance with 4.8.

The measured outlet air temperature T_i of each measurement is the mean value of the five measuring points with the highest values and is expressed in °C, rounded off to one decimal place. The accuracy of measurement is to be within ±3 K.

In order to compensate the variation of the ambient temperature, the measured outlet air temperature T_i has to be corrected in accordance with Formula (1):

$$T_{i,\text{comp}} = T_i - T_{\text{actamb}} + 23\,[°\text{C}] \tag{1}$$

where

$T_{i,\text{comp}}$ is the compensated outlet air temperature, expressed in °C;

T_i is the measured outlet air temperature, expressed in °C;

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

T_{actamb} is the actual ambient temperature measured 100 mm from the air inlet side of the appliance immediately before switching it on, expressed in °C;

23 is the nominal ambient temperature in °C.

The distance between the measuring device and the air outlet is:

- Without attachments: 25 mm and 100 mm, as shown in Figure 3a);
- With a **concentrator**: 100 mm, as shown in Figure 3b);
- With a **diffuser**: 50 mm, as shown in Figure 3c).

The measurement without attachments shall be carried out three times. The mean value of these three measurements is the final outlet air temperature and is calculated from Formula (2):

$$T_{fin} = \frac{T_{1,comp} + T_{2,comp} + T_{3,comp}}{3} [°C] \quad (2)$$

The measurement may be repeated with the control adjusted to lower settings, if any, except for supplying cold air.

5.4.2.2 Outlet air temperature uniformity of hair dryers

During the measurement described in 5.4.2.1, all readings of 53 temperature measuring points are recorded and a temperature distribution graph is plotted as shown in Figure 4 to indicate the uniformity of outlet air temperatures of the **hair dryer**.

5.4.3 Hairstyling appliances with warm air

5.4.3.1 Outlet air temperature of hairstyling appliances with warm air

The appliance is placed in a horizontal position over the thermocouple grid, specified in Figure 1 and Figure 2. The appliance is centred with its axis parallel to the line of measuring points 2 and 52, the distance between the grid and the surface of the barrel holding the brush being 15 mm. The appliance is rotated about its horizontal axis to find out the position giving rise to the highest temperatures.

NOTE A brush is used for disentangling and shaping the hair.

Controls are adjusted to obtain the highest outlet air temperature, and the measurement is taken when the steady condition is reached.

The steady condition can be considered to be reached when the variation range of the mean value of the five measuring points with the highest values is not over 2 K.

The outlet air temperature is the mean value of the five measuring points with the highest temperature, expressed in °C. The temperature shall be corrected in accordance with Formula (1).

The accuracy of the measurement is to be within ±3 K.

5.4.3.2 Outlet air temperature uniformity of hairstyling appliances with warm air

During the measurement described in 5.4.3.1, all readings of 53 temperature measuring points are recorded and a temperature distribution graph is plotted as shown in Figure 4 to indicate the uniformity of outlet air temperatures of the **hairstyling appliance** with warm air.

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

5.4.4 Hair curler

5.4.4.1 Temperature measurement of the barrel of hair curler

The appliance is positioned horizontally and at a distance of at least 100 mm from the test table. Appliances with a stand shall be placed directly on the test table.

Five thermocouples are evenly distributed along the longitudinal edge at the top of the curling barrel (see Figure 5) on the side away from the test table. The thermocouples are not placed under the curling tong.

The appliance is switched on, and the temperatures of 5 measuring points are measured after it has reached steady condition.

The temperature of the barrel is the mean value of the 5 measuring points and is expressed in °C. This temperature shall be corrected in accordance with Formula (1). The ambient temperature shall be measured within 100 mm of the handle immediately before switching on the appliance.

5.4.4.2 Temperature uniformity of the barrel of hair curler

In accordance with the setup of 5.4.4.1, except that the five thermocouples are not applied, the thermal imaging viewer is used to scan the whole barrel area, and temperature uniformity is expressed as the temperature profile, as shown in Figure 6.

5.4.5 Hair straightener

5.4.5.1 Temperature measurement of the heating plate of hair straightener

The appliance is positioned horizontally, and the plane of the straightening plates shall be kept vertical. The bottom plane of the **hair straightener** shall be at least 100 mm away from the test table. Appliances with a stand are placed directly on the test table.

The two straightening plates of the **hair straightener** shall be opened with an angle of 180° during measurement. Five thermocouples are evenly distributed on the heating plate surface along the longitudinal edge (see Figure 7). The two straightening plates shall be measured if both of them are heating plates.

If the two plates are hinged together so that they cannot be opened with an angle of 180°, before the test, the hinge may be made inoperative so that the plates can be opened, but the thermal performance of the plates should not be affected by this action.

The appliance is switched on, and the temperatures of 5 measuring points are taken after it has reached steady condition.

The temperature of the plate is the mean value of the 5 measuring points and is expressed in °C. This temperature shall be corrected in accordance with Formula (1). The ambient temperature is to be measured within 100 mm of the handle immediately before switching on the appliance.

5.4.5.2 Temperature uniformity of the heating plate of the hair straightener

In accordance with the setup of 5.4.5.1, except that the five thermocouples are not applied, the thermal imaging viewer is used to scan the heating plate area and temperature uniformity is expressed as the temperature profile, as shown in Figure 8.

5.5 Air flow of the hair dryer

The measurement setup is shown in Figure 9.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

The distance between the air outlet of **hair dryer** and the anemometers shall be D_d = 200 mm. See Figure 9a).

The measurement shall be carried out with the maximum air flow setting of the **hair dryer** and all attachments removed. The heating function shall be inoperable. The **hair dryer** is switched on and the measurement is started after the steady condition has been reached.

Eight (or 10, or 12) hot wire anemometers shall be arranged along the horizontal test arm. The distance between each anemometer shall be 5 mm. Initially, the arm of anemometer is placed at the mid-height of the air outlet of the **hair dryer**, and is then moved up vertically with an increment of 5 mm until the measurements of all anemometers fall below 24 m/min. The test arm is returned to its starting point and is then moved down vertically with an increment of 5 mm until the measurements of all anemometers fall below 24 m/min. The measurement is completed, and the data shall be recorded.

The total flow rate shall be calculated by assuming that each measurement point (e.g. point A) is indicative of the air velocity through a square of 5 mm × 5 mm centred about that point. See Figure 9b). Therefore, the flow rate shall be calculated by multiplying the measured air velocity by the area of each square.

The area of each square = 5 mm × 5 mm = 25 mm^2 = 0,000 025 m^2

If each of the air velocity measurements is U_i (m/min), and the number of the squares with an air velocity measurement not less than 24 m/min is N, then the total air flow rate of the **hair dryer** will equal the sum of all individual air flow rates through each square as given by:

$$\text{Total flow rate of } \textbf{hair dryer} \text{ in m}^3\text{/min} = \sum_{i=1}^{N}\left(0.000025 U_i\right)$$

5.6 Drying rate of the hair dryer

5.6.1 General

The purpose of this test is to assess the drying ability of a **hair dryer** under standardized test conditions.

The test is carried out at test conditions in accordance with 4.8. The relative humidity in the test room shall be (50 ± 5) %.

Temperature and humidity conditions within the specified ranges are required for good repeatability and reproducibility. Changes during a test should be avoided.

5.6.2 Test equipment

The test equipment, as shown in Figure 10, consists of a balance, a stand for the **hair dryer**, a support for the test cloth and a stopwatch.

The balance shall have an accuracy of 0,02 g.

The test cloth shall be the control cloth defined in ISO 2267 and is fixed to the aluminium circular frame by a rubber O-ring or other suitable means. Surplus cloth is removed.

NOTE Annex B lists two recommended suppliers of the test cloth.

The measurement of time shall be accurate to within 0,1 s.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

Comparative tests shall be carried out with the test cloth from the same manufacturing batch.

5.6.3 Measuring procedure

A new piece of test cloth is to be used for each test. The pieces of test cloth used for the same test series are to come from the same batch.

The **hair dryer** without any attachment is supported by a stand and placed in front of the balance, on which the support with the piece of test cloth is placed, as shown in Figure 10. The **hair dryer** is positioned so that the airflow is perpendicular to the centre of the circular piece of test cloth. The distance D_d between the front of the **hair dryer** and the test cloth is adjusted so that the outlet air temperature is 75 °C. D_d is determined by using the temperatures recorded for the distances of 25 mm and 100 mm during the test in 5.4.2.1 and calculated from Formula (5), rounded off to the nearest integer. This procedure is shown in Figure 11.

The **hair dryer** is operated at the maximum airflow and heating settings.

However, the minimum distance D_d is not less than 25 mm, even if the outlet temperature falls below 75 °C.

$$d_x = \frac{T_{fin25} - 75}{T_{fin25} - T_{fin100}} \times 75 \tag{3}$$

$$D_d = d_x + 25 \tag{4}$$

$$D_d = \frac{T_{fin25} - 0{,}25\ T_{fin100} - 56{,}25}{T_{fin25} - T_{fin100}} \times 100 \tag{5}$$

where

T_{fin25} is the outlet air temperature related to the distance of 25 mm;

T_{fin100} is the outlet air temperature related to the distance of 100 mm;

75 °C is the standard temperature for drying hair;

D_d is the distance to be used for measuring the drying rate.

NOTE 1 The temperature of 75 °C is considered to be an appropriate temperature for drying hair.

NOTE 2 The curve between T_{fin25} at 25 mm and T_{fin100} at 100 mm is non-linear but the error introduced by Formula (5) is negligible.

The **hair dryer** is operated to obtain steady conditions in accordance with 4.8. The balance is tared to zero. The test cloth is evenly moistened by spraying it with (10 ± 0,5) g of distilled water at room temperature. Any surplus water is wiped off from the aluminium ring and the mass of water (m_1) is determined in g to two decimal places. Both the **hair dryer** and the stopwatch are switched on for 60 s to dry the cloth. 5 s after the **hair dryer** has been switched off (waiting time), the residual mass of water (m_2) is determined in g to two decimal places.

NOTE The waiting time of 5 s is necessary for stabilisation.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

5.6.4 Determination of the drying rate

The drying rate D_R is determined from the mass of water evaporated and calculated from Formula (6).

$$D_R = \frac{m_1 - m_2}{60} \tag{6}$$

where

m_1 is the mass of water measured before drying;

m_2 is the mass of water measured after 60 s of drying and 5 s of stabilizing time.

The measurement is carried out three times. The mean drying rate is calculated as the average value of these three measurements.

The drying rate is expressed in g/s, rounded off to one decimal place.

5.7 Measurement of anion concentration of anion hair dryer

For the **anion hair dryer** in which the anion outlet is combined with the air outlet, the control is adjusted to maximum air speed setting and cold air setting (or natural air). If there is no cold air (natural air) setting, the control is adjusted to the lowest temperature setting. The air outlet of the **anion hair dryer** is placed parallel to the sensing plate of the anion tester, with the distance as close to 0 mm as possible. See Figure 12.

For the **anion hair dryer** in which the anion outlet is separate from the air outlet, the control is adjusted to maximum air speed setting and cold air setting (or natural air). If there is no cold air (natural air) setting, the control is adjusted to the lowest temperature setting. The anion outlet of the **anion hair dryer** is placed parallel to the sensing plate of the anion tester, with the distance as close to 0 mm as possible. See Figure 12.

The anion tester with the accuracy of ±10 % is used.

NOTE Annex B lists a recommended supplier of the anion tester.

The **anion hair dryer** is supplied at the **rated voltage**. When the steady condition is reached, the measurement of anion concentration is started for 5 min. During the period of 5 min, the reading is taken every 30 s and 10 readings are obtained. The average of these 10 readings is taken as the anion concentration.

The test is repeated three times, and the average of the three tests is taken. Repeat the test after the appliance returns to the cold state.

5.8 Measurement of tension of hair straightener

The purpose of the measurement is to evaluate the tension uniformity of the **hair straightener**.

Ten stainless steel wires with a 1,5 mm diameter and not less than 400 mm in length are used. The flatness of the steel wire shall be less than 1 mm/m and the roughness (Ra) shall be less than 0,6 µm. The steel wires are evenly distributed with a space of 6 mm. Each wire is attached to a tension meter. The test set up is shown in Figure 13. The 10 wires are placed between the **hair straightener** plates in the middle area and are kept in a vertical state.

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

The **hair straightener** is powered on. After 30 s, a force of 20 N is applied onto the two plates. The **hair straightener** is moved down along the wires at a speed of 1 mm/s, and the distance moved is 60 mm. During the movement, the tension in each wire is read per 0,5 s and the measured tension (F_1, F_2,...F_{10}) in each individual wire is calculated as the average of all readings. F_1, F_2,...F_{10} are recorded.

The tension uniformity of the **hair straightener** can also be illustrated in a graph, as shown in Figure 14.

5.9 Drop endurance test

The appliance is placed on a test table having a height of 90 cm and with the cord inlet (30 ± 5) cm from the table edge. The cord is perpendicular to the table edge. The appliance shall be pulled on the cord without jerks with a speed of (5 ± 2) cm/s, allowing a free fall onto a concrete, or similarly hard, surface.

The test is carried out with the appliance being switched off.

After dropping the appliance, it is checked to see if it still operates satisfactorily. Significant damage or changes are to be noted, e.g.

– broken parts;
– impaired switch settings;
– change of input power;
– change in sound.

If the appliance can still operate normally, the above dropping, inspection and recording shall be repeated. This process shall be repeated until the appliance is unable to be operated normally because of the previous free-drop test. The number of free-drop tests that the appliance can bear shall be recorded.

5.10 Service life test

5.10.1 Hair dryer

The **hair dryer** is run under no-load condition at **rated voltage** for 30 min and is switched off and rested for 30 min. For **hair dryers** with an automatic power-off function and with an operating time of less than 30 min, the **hair dryer** is run until it powers off automatically and is rested for 30 min.

This cycle is repeated until the **hair dryer** fails to operate, or until the established number of cycles is reached, whichever is shorter.

The total cumulative working time and the failure mode shall be recorded.

The number of established cycles may be agreed between the manufacturer or the client and the laboratory before the test.

5.10.2 Hair curler

The **hair curler** is run under no-load condition at **rated voltage** for 30 min and is switched off and rested for 30 min. For **hair curlers** with an automatic power-off function and with an operating time of less than 30 min, the **hair curler** is run until it powers off automatically and is rested for 30 min.

This cycle is repeated until the **hair curler** fails to operate, or until the established number of cycles is reached, whichever is shorter.

Documents
Document Sharing Hub
Full document details: IEC 61855 2022

The total cumulative working time and the failure mode shall be recorded.

The number of established cycles may be agreed between the manufacturer or the client and the laboratory before the test.

5.10.3 Hair straightener

The **hair straightener** is run under no-load condition at **rated voltage** for 30 min and is switched off and rested for 30 min. For **hair straighteners** with an automatic power-off function and with an operating time of less than 30 min, the **hair straightener** is run until it powers off automatically and is rested for 30 min.

This cycle is repeated until the **hair straightener** fails to operate, or until the established number of cycles is reached, whichever is shorter.

The total cumulative time and the failure mode shall be recorded.

The number of established cycles may be agreed between the manufacturer or the client and the laboratory before the test.

5.11 Attachment of accessories

5.11.1 Reliability

The test is carried out with the appliance at ambient temperature not being operated and repeated 15 min after the appliance has been operated.

The accessory is attached to the appliance. A mass of 1 kg is applied to the front of the accessory at its centre. The appliance is moved in all directions from the horizontal to the vertical without jerks.

It is checked whether the accessory remains in its initial position.

5.11.2 Ease of handling

The purpose of this test is to check for the ease of fitting and removal of accessories. It is carried out by panel testing, as described for example in IEC/TR 61592.

6 Measurement of airborne acoustical noise

The noise of the hair care appliance shall be measured in accordance with IEC 60704-2-9.

7 Features

7.1 Control settings

The number of control settings and the intended functions are noted.

7.2 Accessories

The number and type of accessories are noted.

7.3 Additional features

Special features relevant for the user (e.g. voltage selector, air inlet filter, temperature sensor,) are noted.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022

8 Instructions for use

The instructions are checked to determine if they contain information about:

– the use of the appliance and its accessories, if any;
– the cleaning necessary to ensure the proper performance of the appliance.

Documents
Document Sharing Hub

Full document details: IEC 61855 2022