IEC 60436

Edition 5.0 2025-06

Corrected version
2026-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric dishwashers for household use - Methods for measuring the performance

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

ICS 97.040.40

ISBN 978-2-8327-0490-5

IEC 60436:2025-06(en-fr)



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2025 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 It also gives information on projects, replaced and withdrawn publications.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, graphical symbols and the glossary. 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 22 500 terminological entries in English and French, with equivalent terms in 25 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, symboles graphiques et le glossaire. 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 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

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.

CONTENTS

FOREWORD 8
INTRODUCTION 10
1 Scope 11
2 Normative references 11
3 Terms, definitions and symbols 11
3.1 Terms and definitions 11
3.2 Symbols 16
3.2.1 Symbols related to the application of egg (6.4.5.3) 16
3.2.2 Symbols related to the calculation of the drying index (7.2.3) 16
3.2.3 Symbols related to the calculation of the cleaning index (7.3.2) 16
3.2.4 Symbols related to the measurements (Clause 8 and Annex U) 17
3.2.5 Symbols related to the microwave calibration (Annex F) 17
4 List of measurements 17
5 General conditions for measurements 18
5.1 General 18
5.1.1 General information 18
5.1.2 Free-standing dishwasher (3.1.2) 19
5.1.3 Built-in dishwasher (3.1.3) and integrated dishwashers (3.1.4) 19
5.1.4 Multi-compartment dishwashers (3.1.1) 19
5.2 Sequence of test procedures and conditioning of the test machine (3.1.5) 19
5.3 Electricity supply for machines 20
5.3.1 Electricity supply for test machine (3.1.5) 20
5.3.2 Electricity supply for the reference machine (3.1.6) 20
5.4 Test programme (3.1.14) 20
5.5 Ambient conditions 20
5.6 Water 21
5.6.1 General 21
5.6.2 Water temperature 21
5.6.3 Water hardness 21
5.6.4 Water pressure 22
5.6.5 Additional water quality parameters 22
5.7 Detergent (3.1.23) 22
5.8 Rinse aid (3.1.24) 23
5.9 Salt 23
5.10 Intermittently recurring functions (3.1.40) 23
5.10.1 Provision of information 23
5.10.2 Impact of intermittently recurring functions (3.1.40) on reproducibility and the validity of test results 24
5.10.3 Treatment of intermittently recurring functions (3.1.40) 24
6 Combined cleaning and drying performance tests 24
6.1 General and purpose 24
6.2 Load 25
6.2.1 Composition of the test load 25
6.2.2 Requirements for pre-conditioning of new tableware (3.1.9) 25
6.2.3 Requirements for conditioning of tableware (3.1.9) 25
6.2.4 Requirements for re-conditioning tableware (3.1.9) 25

6.3 Soiling agents and preparation equipment 25
6.4 Preparation and application of soiling agents 26
6.4.1 General 26
6.4.2 Milk 27
6.4.3 Tea 28
6.4.4 Minced meat 30
6.4.5 Egg 31
6.4.6 Oat flakes 32
6.4.7 Spinach 32
6.4.8 Margarine 34
6.5 Drying of the soiled tableware (3.1.9) items 34
6.5.1 General 34
6.5.2 Oven drying method 34
6.5.3 Air drying method 36
6.6 Loading and operating 36
6.6.1 Loading 36
6.6.2 Operating 36
7 Combined cleaning and drying performance assessment 37
7.1 General requirements 37
7.2 Determination of the drying performance 37
7.2.1 General requirements to enable subsequent cleaning assessment 37
7.2.2 Drying assessment procedure 38
7.2.3 Calculation of the drying index 41
7.3 Determination of the cleaning performance 42
7.3.1 General 42
7.3.2 Calculation of the cleaning index 45
7.3.3 Dishwasher (3.1.1) filter systems 46
7.3.4 Assessing ln W_C 47
7.4 Results 47
7.4.1 Expressing drying results 47
7.4.2 Expressing cleaning results 47
8 Energy consumption, water consumption, programme time (3.1.17) 48
8.1 General and purpose 48
8.2 Method of measurement 48
8.3 Method of evaluation 48
8.3.1 General 48
8.3.2 Energy consumption 49
8.3.3 Hot water energy 49
8.3.4 Water consumption 50
8.3.5 Time 50
9 Airborne acoustical noise 50
Annex A (normative) Place settings (3.1.10) and serving pieces (3.1.11) 51
A.1 General information 51
A.2 Test load specifications 51
Annex B (informative) Tableware (3.1.9) specifications 56
Annex C (normative) Illustration of soil application quantities 63
C.1 Soil application 63
C.1.1 Soil application example for type A tableware (3.1.9) items 63

C.1.2 Soil application example for type B tableware (3.1.9) items 63
C.1.3 Soil application on the serving pieces (3.1.11) 64
C.1.4 Soil application quantities for different rated dishwasher capacities (3.1.12) 64
Annex D (informative) Pictures of the soiled items 66
Annex E (normative) Test additives 70
E.1 General 70
E.2 Detergent (3.1.23) 70
E.3 Rinse aid (3.1.24) 72
E.4 Salt 73
Annex F (normative) Microwave oven 74
F.1 Specification of the microwave oven 74
F.2 Calibration of the microwave oven 74
Annex G (normative) Through-circulation thermal cabinet 76
G.1 Specification of the thermal cabinet 76
G.2 Calibration of the thermal cabinet 76
Annex H (informative) Alternate cleaning and drying assessment tables 78
H.1 General 78
H.2 Alternate drying performance table 78
H.3 Alternate cleaning performance table 80
Annex I (normative) Description of the reference machine (3.1.6) type 2 83
I.1 General 83
I.2 Installation and use of the reference machine (3.1.6) 83
I.3 Specification of the reference machine (3.1.6) 84
I.3.1 General specifications 84
I.3.2 Specifications of performance values 84
I.4 Specification check of the reference machine (3.1.6) 84
I.4.1 General 84
I.4.2 Checking spray arm rotation 85
I.4.3 Checking the water hardness 85
I.4.4 Checking the energy consumption and water consumption 85
I.4.5 Checking the programme time (3.1.17) 85
I.4.6 Checking the water temperature in the sump 85
I.4.7 Checking the cleaning and drying performance 85
I.4.8 Checking the water level in the sump 86
I.5 Reference machine (3.1.6) loading plan 86
Annex J (informative) Shade chart 88
J.1 General 88
J.2 Classification of shade numbers 88
Annex K (normative) Measurement of energy consumption in low power modes of dishwashers (3.1.1) 89
K.1 General 89
K.2 Determination of left-on mode (3.1.26) power 91
K.3 Determination of left on mode duration (3.1.33) 91
K.4 Determination of off mode (3.1.27) power 91
K.5 Determination of standby mode (3.1.29) power 92
K.6 Determination of standby mode in condition of networked standby (3.1.30) 92
K.7 Determination of delay start mode (3.1.31) power 93

K.8 Measurement procedure for low power modes 94
Annex L (informative) Suppliers of test materials 97
Annex M (informative) Test report contents 98
M.1 General 98
M.2 Machine description 98
M.3 Laboratory details 98
M.4 Test conditions 98
M.5 Test results and measurements 98
M.5.1 Setup 98
M.5.2 Results 99
Annex N (normative) Test enclosure for built-in dishwasher (3.1.3) and integrated dishwashers (3.1.4) 100
Annex O (informative) Internal evaluation guidelines 102
Annex P (informative) Test procedure for sensing programmes (3.1.14) 103
P.1 General 103
P.2 General conditions 103
P.3 Loading 104
P.4 Soiling 104
P.5 Measured data 104
Annex Q (informative) Additional rinse performance evaluation 105
Q.1 General 105
Q.2 General conditions 105
Q.3 Loading 105
Q.4 Evaluation 105
Q.5 Measured data 106
Annex R (informative) Dishwasher (3.1.1) filtration evaluation 107
R.1 General 107
R.2 General conditions 107
R.3 Test procedure 107
R.3.1 General 107
R.3.2 Coffee grounds 107
R.3.3 Spinach 109
R.4 Evaluation 109
Annex S (informative) Flow chart – evaluation of filter systems 113
Annex T (normative) Instrumentation and accuracy 114
Annex U (informative) Inlet water temperature influence on energy consumption 115
U.1 General 115
U.2 Cold water energy correction 115
U.3 Correlating energy consumption tests with different cold water inlet temperatures 116
U.3.1 General 116
U.3.2 Estimating regional energy consumption from standard cold water temperature 117
U.3.3 Estimating standard energy consumption from regional cold water temperature 117
Annex V (informative) Testing intermittently recurring functions (3.1.40) 119
V.1 General 119
V.2 Test series (3.1.8) design 119

V.3 Method of evaluation 120
V.3.1 General 120
V.3.2 Energy consumption 121
V.3.3 Hot water energy 121
V.3.4 Water consumption 121
V.3.5 Time 121
V.4 Ballast soil 121
V.4.1 Dose 121
V.4.2 Preparation 122
V.4.3 Storage 122
V.4.4 Application 122
Annex W (normative) Description of the reference machine (3.1.6) type 3 126
W.1 General 126
W.2 Installation and use of the reference machine (3.1.6) 126
W.3 Specification of the reference machine (3.1.6) 126
W.3.1 General specifications 126
W.3.2 Specifications of performance values 127
W.4 Specification check of the reference machine (3.1.6) 127
W.4.1 General 127
W.4.2 Checking spray arm rotation 128
W.4.3 Checking the water hardness 128
W.4.4 Checking the energy consumption and water consumption 128
W.4.5 Checking the temperature during the programme (3.1.14) 128
W.4.6 Checking the programme time (3.1.17) 129
W.4.7 Checking the cleaning and drying performance 129
W.4.8 Checking the water level in the sump 129
W.5 Reference machine (3.1.6) loading plan 130
Annex X (informative) Multi-compartment dishwashers (3.1.1) 131
X.1 General 131
X.1.1 Multi-compartment dishwasher (3.1.1) 131
X.1.2 Multi-compartment mode 131
X.1.3 Combined rated dishwasher capacity (3.1.12) 131
X.2 Measurement and evaluation of the compartments of a multi-compartment dishwasher (3.1.1) 131
X.3 Rated capacity and detergent (3.1.23) dosage for compartments operated in multi-compartment mode 131
X.4 Combined cleaning and drying performance tests for dishwasher (3.1.1) in multi-compartment mode 132
X.4.1 Preparation 132
X.4.2 Loading and operating 132
X.5 Combined cleaning and drying performance assessment for dishwasher (3.1.1) in multi-compartment mode 132
X.5.1 General 132
X.5.2 Assessment of drying performance 132
X.5.3 Assessment of cleaning performance 133
X.6 Energy consumption, water consumption, programme time (3.1.17) in multi-compartment mode 133
X.6.1 General 133
X.6.2 Energy consumption 133
X.6.3 Water consumption 133

X.6.4 Programme time (3.1.17) 133
Annex Y (informative) Implementation of test class 134
Y.1 Overview 134
Y.1.1 General 134
Y.1.2 Test series (3.1.8) 134
Y.1.3 Test class 134
Y.2 Purpose of test series (3.1.8) – Test class 134
Y.3 Operating 135
Y.4 Performance assessment 135
Y.4.1 Cleaning and drying performance assessment 135
Y.4.2 Drying assessment procedure 135
Y.4.3 Calculation of the drying index according to 7.2.3 136
Y.4.4 Determination of the cleaning performance 136
Bibliography 137

Figure 1 – Position of the glasses on the microwave turntable 28
Figure 2 – Thermal cabinet for pre-drying of soiled cups, mugs and saucers 29
Figure 3 – Schematic view of the different beef pieces 30
Figure 4 – The thermal cabinet with soiled load items (30 place settings (3.1.10)) 35
Figure D.1 – Figure D.1 Minced meat mixture: Glass bowl, oval platter, oven pan 66
Figure D.2 – Egg yolk: Dinner plate, melamine dessert plate, fork 66
Figure D.3 – Oat flakes: Soup plate, dessert bowl, soup spoon 67
Figure D.4 – Spinach: Dessert plate, small pot 67
Figure D.5 – Milk: Glass 67
Figure D.6 – Tea: Cups, mugs and saucers (pictures were made after oven drying) 68
Figure D.7 – Margarine: Melamine bowl 69
Figure G.1 – Location of the thermocouple on upper, intermediate and lower wire shelves 77
Figure I.1 – Maximum water level in the reference machine (3.1.6) at the end of cycle 86
Figure I.2 – Reference machine (3.1.6) loading plan - cutlery rack 86
Figure I.3 – Reference machine (3.1.6) loading plan - upper and lower baskets 87
Figure K.1 – Required door position in the case of opened and unlatched door (left picture) 90
Figure N.1 – Test enclosure for built-in dishwashers (3.1.3) and integrated dishwashers (3.1.4) 101
Figure Q.1 – Example for an assessment light box 106
Figure Q.2 – Photo catalogue to assess spots on glasses 106
Figure R.1 – Suitable sieves for grounded coffee 108
Figure R.2 – Soiled melamine bowl with margarine and coffee grounds 109
Figure S.1 – Flow chart – evaluation of filter systems 113
Figure V.1 – Flow chart showing the general test design for assessing intermittently recurring functions (3.1.40) 123
Figure W.1 – Possible position for temperature sensor. 129
Figure W.2 – Maximum water level in the reference machine (3.1.6) at the end of cycle. 130
Figure W.3 – Reference machine (3.1.6) loading plan 130

Table 1 – Evaluation of the drying performance 39
Table 2 – Evaluation to determine the drying performance 40
Table 3 – Evaluation of the cleaning performance 43
Table 4 – Evaluation to determine the cleaning performance 43
Table 5 – Numerical values of the t-factor for statistical calculations 46
Table A.1 – Specifications of tableware (3.1.9) items 51
Table A.2 – Composition of test loads 53
Table B.1 – Tableware (3.1.9)specifications 57
Table C.1 – Soil application example for type A tableware (3.1.9) items 63
Table C.2 – Soil application example for type B tableware (3.1.9) items 63
Table C.3 – Soil application on the serving pieces (3.1.11) 64
Table C.4 – Soil application quantities for different rated dishwasher capacities (3.1.12) 64
Table E.1 – Ingredients of reference detergent (3.1.23) type E 70
Table E.2 – Ingredients of reference rinse aid (3.1.24) III 72
Table H.1 – Alternate drying performance table 78
Table H.2 – Alternate cleaning performance table 80
Table J.1 – Shade chart 88
Table K.1 – Measurement procedure for low power modes 94
Table P.1 – Test scenarios for testing the sensing programme (3.1.14) 103
Table P.2 – Example for a one week schedule 104
Table R.1 – Evaluation to determine the cleaning performance 110
Table R.2 – Soil application on the serving pieces (3.1.11) 111
Table R.3 – Soil application quantities for different rated dishwasher capacities (3.1.12) 112
Table T.1 – Specification of instruments 114
Table V.1 – Intermittently recurring function (3.1.40)data provided by the manufacturer / supplier 124
Table V.2 – Record of preparatory and trigger cycles (3.1.15) carried out before and / or between test runs (3.1.7) 124

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Electric dishwashers for household use - 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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60436 has been prepared by subcommittee 59A: Electric dishwashers, of IEC technical committee 59: Performance of household and similar electrical appliances. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2015, and Amendment 1:2020. This edition constitutes a technical revision.

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

a) Implementation of a new reference machine, which better reflects modern dishwasher energy and water saving technologies. Its ability to function as a reference machine for the cleaning assessment was assessed in a Round Robin Test.

b) Implementation of the new reference detergent type E, which better reflects market detergents formulations. It includes upgraded enzymes and a lower content of silicates to reduce the alkalinity which simplifies the world wide transportation by avoiding dangerous goods labelling and therefore improves the usage all over the world.

c) Implementation of an alignment factor for the cleaning performance assessment as proposed in a scientific study done by an university to align test results of the previous version to the new version of this document with the new reference system described above.

d) Introduction of replacements and alternatives for the pan and knives as the production of the current ones was stopped.

e) Improvement of the room temperature control by a temperature measurement inside the dishwasher directly prior to the start of the test programme.

f) Update of the weight of different load items and the specified ranges to anneal the requirements in the document to the actual weight of the items.

g) Introduction of an updated method to assess low power modes providing a step-by-step measurement description and including new modes, e.g. network standby which are of increased importance for dishwasher offering additional services via internet connection. Additionally, reactions to different interactions with the appliance can be assessed in a better way and learnings of Round Robin Test are included.

h) Inclusion of additional method for dishwasher testing which allows the assessment of variations of dishwasher units from one model.

i) New requirements for the loading and handling instructions for tests institutes.

j) Implementation of testing methodology for multi-compartment dishwashers.

k) Improvement of ballast soil preparation process in Annex V.

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

Draft	Report on voting
59A/273/FDIS	59A/276/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/publications.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability 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, or

– revised.

The content of the corrigendum 1 (2026-04) has been included in this copy.

INTRODUCTION

The history of this fifth edition of IEC 60436 is provided as follows:

– Discussion began in fourth quarter of 2021 during one of the web conferences of Maintenance Team 2.

– A first working draft was developed and discussed during the Qingdao China meeting in September 2023.

– It was decided by SC 59A to proceed directly to CDV, skipping CD stage, due to urgency of implementation of the new detergent (3.1.23) E. This urgency is caused by production termination of enzymes used for detergent (3.1.23) D composition.

– Implementation of new reference system, the new reference detergent (3.1.23) and the new reference machine (3.1.6), is done based on data coming from Round Robin Test conducted in 2022-2023.

Further readings:

ISO/IEC Guide 98-3:2008/Suppl 2:2011 [1], *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995) – Supplement 2: Extension to any number of output quantities*

ISO/IEC Guide 98-4:2012 [2], *Uncertainty of measurement – Part 4: Role of measurement uncertainty in conformity assessment*

DIN 5035-6:2006 [3], *Beleuchtung mit künstlichem Licht – Teil 6: Messung und Bewertung* ("Lighting *with artificial light – Part 6: Measurements and evaluation*")

ISO 3310-1:2016 [4], *Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth*

EN 12665:2011 [5], *Light and lighting – Basic terms and criteria for specifying lighting requirements*

IEC 60704-3:2019 [6], *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values*

ISO/IEC Guide 98-1:2024 [7], *Guide to the expression of uncertainty in measurement — Part 1: Introduction*

ISO/IEC Guide 98-3:2008 [8], *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

ISO/IEC Guide 98-3:2008/Suppl 1:2008 [9], *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995) – Supplement 1: Propagation of distributions using a Monte Carlo method*

1 Scope

This document applies to electric dishwashers (3.1.1) for household and similar use that are supplied with hot and/or cold water.

The object of this document is to state and define the principal performance characteristics of electric dishwashers (3.1.1) for household and similar use and to describe the standard methods of measuring these characteristics.

This document is concerned neither with safety nor with minimum performance requirements.

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 60704–2–3, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-3: Particular requirements for dishwashers*

IEC 60705, *Household microwave ovens – Methods for measuring performance*

IEC 60734:2012, *Household electrical appliances - Performance - Water for testing*

IEC 62301:2011, *Household electrical appliances - Measurement of standby power*

IEC 63474, *Electrical and electronic household and office equipment - Measurement of networked standby power consumption of edge equipment*

ISO 607, *Surface active agents and detergents – Methods of sample division*

ISO 80000-1:2022, *Quantities and units — Part 1: General*

DIN 51757, *Testing of mineral oils and related materials - Determination of density*

EN 1262, *Surface active agents - Determination of pH value of solutions or dispersions*

3 Terms, definitions and symbols

3.1 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

3.1.1
dishwasher
machine that cleans, rinses and dries tableware (3.1.9) by chemical, mechanical, thermal, and electric means

Note 1 to entry: A dishwasher (3.1.1) can have a specific drying operation (3.1.13) at the end of the programme (3.1.14).

Note 2 to entry: Different dishwasher (3.1.1) types are designated by manufacturers e.g. free-standing, built-in or integrated.

3.1.2
free-standing dishwasher
dishwasher (3.1.1) which is intended to be installed without an enclosing structure

3.1.3
built-in dishwasher
dishwasher (3.1.1) which is intended to be installed inside an enclosing structure such as a kitchen cupboard

3.1.4
integrated dishwasher
built-in dishwasher (3.1.3) which is designed to have a board fitted to the dishwasher (3.1.1) door

3.1.5
test machine
dishwasher (3.1.1) under test

3.1.6
reference machine
dishwasher (3.1.1) of known performance used to standardize cleaning and drying performance measurements

Note 1 to entry: Two reference machines (3.1.6) are specified for use in this document (see Annex I and Annex W).

3.1.7
test run
single programme (3.1.14) performance assessment

3.1.8
test series
set of test runs (3.1.7) which are collectively used to assess the performance

3.1.9
tableware
dishware, glassware, cutlery and serving pieces (3.1.11) used according to this document to test a dishwasher (3.1.1)

3.1.10
place setting
set of tableware (3.1.9) for the use by one person, not including serving pieces (3.1.11)

Note 1 to entry: A place setting (3.1.10) is comprised of different items used for breakfast and lunch (type A); and dessert and dinner (type B).

3.1.11
serving pieces
set of items for preparation and serving of food which can include pot and pan, serving bowls, serving cutlery and a platter

3.1.12
rated dishwasher capacity
whole number of place settings (3.1.10) together with the serving pieces (3.1.11) which can be cleaned and dried in one cycle (3.1.15) when loaded in accordance with the manufacturer's instructions

Note 1 to entry: The rated dishwasher capacity (3.1.12) is declared by the manufacturer and expressed as a number of place settings (3.1.10).

3.1.13
operation
each event that occurs during the dishwasher (3.1.1) programme (3.1.14) such as cleaning, rinsing or drying

3.1.14
programme
series of operations (3.1.13) which are pre-defined within the dishwasher (3.1.1) and which are declared as suitable for specified levels of soil and/or type of load

Note 1 to entry: Usually, an end of programme (3.1.14) indicator signals the end of the programme (3.1.14) and the user has access to the load.

3.1.15
cycle
complete cleaning, rinsing, and drying process, as defined by the programme (3.1.14) selected, consisting of a series of operations (3.1.13) until all activity ceases (3.1.39)

Note 1 to entry: The cycle (3.1.15) can be equal to or last longer than the programme (3.1.14).

3.1.16
cycle time
length of time beginning with the initiation of the cycle (3.1.15) (of the selected programme (3.1.14)), excluding any user programmed delay, until all activity ceases (3.1.39)

3.1.17
programme time
length of time beginning with the initiation of the programme (3.1.14), excluding any user-programmed delay, until an end of programme (3.1.14) indicator is activated and the user has access to the load

Note 1 to entry: If there is no end of programme (3.1.14) indicator, the programme time (3.1.17) is equal to the cycle time (3.1.16).

3.1.18
automatic dispenser
device activated automatically which injects or dispenses detergent (3.1.23) or rinse aid (3.1.24), one or more times into the dishwasher (3.1.1) at predetermined points in the dishwasher (3.1.1) cycle (3.1.15)

3.1.19
non-automatic dispenser
device, usually a fixed cup or cavity on the dishwasher (3.1.1) door, cover, or rack (3.1.22), which deposits a previously measured amount of detergent (3.1.23) or rinse aid (3.1.24), into the dishwasher (3.1.1)

3.1.20
water softener
device which reduces the hardness of water

3.1.21
regeneration
process by which softening capacity is restored to a water softener (3.1.20)

3.1.22
rack
support for holding dishware, cutlery, and/or glassware in the dishwasher (3.1.1)

3.1.23
detergent
cleaning agent for use in dishwashers (3.1.1) to aid in the removal of food soils by chemical means

Note 1 to entry: A reference detergent (3.1.23) in powder form is specified for use in this document (see 5.7).

3.1.24
rinse aid
chemical agent added to the water in the last rinsing operation (3.1.13) to improve the drying effect and reduce water marks

Note 1 to entry: A reference rinse aid (3.1.24) is specified for use in this document (see 5.8).

3.1.25
void

3.1.26
left-on mode
mode that begins as soon as the dishwasher (3.1.1) door has been opened and/or unlatched by the user after the completion of the programme (3.1.14), and continues without any further intervention from the user

Note 1 to entry: In some products, this mode can be equivalent to the off mode (3.1.27).

Note 2 to entry: This mode can persist indefinitely or can be of limited duration if the dishwasher (3.1.1) is equipped with a power management system (3.1.34).

3.1.27
off mode
condition in which the test dishwasher (3.1.1) is connected to the mains and is not providing any function

Note 1 to entry: The following shall also be considered as off mode (3.1.27):

a) conditions providing only an indication of off mode (3.1.27);

b) conditions providing only functionalities intended to ensure electromagnetic compatibility

3.1.28
network
communication infrastructure with a topology of links, an architecture, including the physical components, organizational principles, communication procedures and formats (protocols)

3.1.29
standby mode
condition where the test dishwasher (3.1.1) is connected to the mains and provides only the following functions, which could persist for an indefinite time:

a) reactivation function, or reactivation function and a mere indication of enabled reactivation function; and/or

b) reactivation function through a connection to a network (3.1.28); and/or

c) information or status display; and/or

d) detection function for emergency measures

3.1.30
networked standby
condition where the household dishwasher (3.1.1) is connected to the mains and provides only the reactivation function through a connection to a network (3.1.28), which can persist for an indefinite time

Note 1 to entry: This mode is only applicable to dishwashers (3.1.1) that provide a connection function to a network (3.1.28).

3.1.31
delay start mode
condition where the user has selected a specified delay to the beginning of the selected programme (3.1.14)

Note 1 to entry: This mode is only applicable to dishwashers (3.1.1) that provide a delay start function for the user.

3.1.32
void

3.1.33
left-on mode duration
time from the start of left-on mode (3.1.26) until the dishwasher (3.1.1) reverts automatically to off mode (3.1.27)

Note 1 to entry: This time span is only applicable to dishwashers (3.1.1) equipped with power management systems (3.1.34).

3.1.34
power management system
system within the dishwasher (3.1.1) which allows it to revert automatically to off mode (3.1.27) or standby mode (3.1.29) after the completion of the programme (3.1.14)

3.1.35
refrigerate
storage of foods at a temperature of (4 ± 3) °C

3.1.36
freeze
storage of foods at a temperature of (−18 ± 3) °C

3.1.37
automatic or self-cleaning filter
filter system which does not require frequent cleaning by the user

3.1.38
manual filter
filter system which requires cleaning by the user after each cycle (3.1.15)

Note 1 to entry: The information on manual filter (3.1.38) shall be provided to the user.

3.1.39
all activity ceases
power consumption decreases to a low steady state in which the power fluctuates by no more than 10 % or 0,1 W, whichever is the greater, over a period of at least 60 min

3.1.40
intermittently recurring function
function that occurs during some, but not all, series of operations (3.1.13) of a specific programme (3.1.14) (or programmes (3.1.14)) and that is directly related to water-softening operations (3.1.13), water-reuse operations (3.1.13) or similar operations (3.1.13) and that alters water consumption, energy consumption and/or programme time (3.1.17)