

|            |                                                                               |                                        |
|------------|-------------------------------------------------------------------------------|----------------------------------------|
| <b>STN</b> | <b>Metódy hodnotenia funkčných vlastností<br/>mobilných domácich robotov.</b> | <b>STN<br/>EN 62849</b><br><br>36 1064 |
|------------|-------------------------------------------------------------------------------|----------------------------------------|

Performance evaluation methods of mobile household robots

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 03/17

Obsahuje: EN 62849:2016, IEC 62849:2016

**124585**

---

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017  
Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 62849**

December 2016

ICS 97.030

English Version

**Performance evaluation methods  
of mobile household robots  
(IEC 62849:2016)**

Méthodes d'évaluation de l'aptitude à la fonction  
des robots mobiles à usage domestique  
(IEC 62849:2016)

Verfahren zur Bewertung der Leistungsfähigkeit  
von mobilen Haushaltrobotern  
(IEC 62849:2016)

This European Standard was approved by CENELEC on 2016-09-29. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## **European foreword**

The text of document 59/655/FDIS, future edition 1 of IEC 62849, prepared by IEC/TC 59 "Performance of household and similar electrical appliances" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62849:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-06-29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-09-29

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## **Endorsement notice**

The text of the International Standard IEC 62849:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

|                  |      |                                           |
|------------------|------|-------------------------------------------|
| IEC 60335-1:2010 | NOTE | Harmonized as EN 60335-1:2012 (modified). |
|------------------|------|-------------------------------------------|

## Annex ZA

(normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

| <u>Publication</u> | <u>Year</u> | <u>Title</u>                                                                                                                | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------|--------------|-------------|
| IEC/TS 62885-1     | -           | Surface cleaning appliances -<br>Part 1: General requirements on test<br>material and test equipment                        | -            | -           |
| IEC 62929          | 2014        | Cleaning robots for household use - Dry<br>cleaning: Methods of measuring<br>performance                                    | EN 62929     | 2014        |
| ISO 554            | -           | Standard atmospheres for conditioning<br>and/or testing - Specifications                                                    | -            | -           |
| ISO 2768-1         | 1989        | General tolerances -<br>Part 1: Tolerances for linear and angular<br>dimensions without individual tolerance<br>indications | EN 22768-1   | 1993        |



IEC 62849

Edition 1.0 2016-08

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Performance evaluation methods of mobile household robots**

**Méthodes d'évaluation de l'aptitude à la fonction des robots mobiles à usage domestique**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2016 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 Central Office  
 3, rue de Varembe  
 CH-1211 Geneva 20  
 Switzerland

Tel.: +41 22 919 02 11  
 Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://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 corrigenda or an amendment might have been published.

##### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

##### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

##### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

##### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

##### IEC Customer Service Centre - [webstore.iec.ch/csc](http://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: [csc@iec.ch](mailto:csc@iec.ch).

#### 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.

##### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

##### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

##### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

##### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

##### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).



IEC 62849

Edition 1.0 2016-08

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



---

**Performance evaluation methods of mobile household robots**

**Méthodes d'évaluation de l'aptitude à la fonction des robots mobiles à usage domestique**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

---

ICS 97.030

ISBN 978-2-8322-3596-6

|                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Warning! Make sure that you obtained this publication from an authorized distributor.</b></p> <p><b>Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.</b></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## CONTENTS

|                                                  |    |
|--------------------------------------------------|----|
| FOREWORD.....                                    | 4  |
| INTRODUCTION.....                                | 6  |
| 1 Scope.....                                     | 7  |
| 2 Normative references.....                      | 7  |
| 3 Terms and definitions .....                    | 7  |
| 4 General conditions for testing .....           | 8  |
| 4.1 Conditions prior to testing.....             | 8  |
| 4.2 Operating and environmental conditions ..... | 8  |
| 4.2.1 General .....                              | 8  |
| 4.2.2 Operating conditions .....                 | 8  |
| 4.2.3 Atmospheric conditions .....               | 8  |
| 4.2.4 Lighting conditions .....                  | 9  |
| 4.3 Test equipment and materials.....            | 9  |
| 4.4 Number of samples .....                      | 9  |
| 4.5 Preparation of battery.....                  | 9  |
| 4.6 Operation of the mobile household robot..... | 9  |
| 4.7 Tolerance of dimensions .....                | 9  |
| 5 Units .....                                    | 10 |
| 6 Pose measurements .....                        | 10 |
| 6.1 General.....                                 | 10 |
| 6.2 Test bed .....                               | 10 |
| 6.2.1 General .....                              | 10 |
| 6.2.2 Test mode.....                             | 11 |
| 6.3 Test method.....                             | 11 |
| 7 Capability of homing function .....            | 12 |
| 7.1 General.....                                 | 12 |
| 7.2 Test bed .....                               | 12 |
| 7.3 Test method.....                             | 13 |
| 8 Operation time per single charge .....         | 14 |
| 8.1 General.....                                 | 14 |
| 8.2 Test bed .....                               | 14 |
| 8.3 Test method.....                             | 15 |
| 9 Managing a single step .....                   | 15 |
| 9.1 General.....                                 | 15 |
| 9.2 Test bed .....                               | 16 |
| 9.3 Test method (autonomous modes).....          | 16 |
| 9.4 Test method (manual modes) .....             | 17 |
| 10 Obstacle avoidance .....                      | 17 |
| 10.1 General.....                                | 17 |
| 10.2 Test bed .....                              | 17 |
| 10.3 Test method.....                            | 18 |
| 11 Cable traversing behaviour .....              | 19 |
| 11.1 General.....                                | 19 |
| 11.2 Test bed .....                              | 19 |
| 11.2.1 General .....                             | 19 |
| 11.2.2 Circles mark setting .....                | 20 |

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| 11.2.3 Cable.....                                                                  | 20 |
| 11.3 Test method.....                                                              | 21 |
| Annex A (normative) .....                                                          | 23 |
| A.1 General.....                                                                   | 23 |
| A.2 Door specification .....                                                       | 26 |
| Bibliography .....                                                                 | 27 |
| Figure 1 – Pose measurements configuration .....                                   | 12 |
| Figure 2 – Capability of homing function configuration .....                       | 13 |
| Figure 3 – Operation time per single charge configuration.....                     | 14 |
| Figure 4 – Managing a single step configuration .....                              | 16 |
| Figure 5 – Starting position for managing a single step test .....                 | 17 |
| Figure 6 – Obstacle avoidance configuration .....                                  | 18 |
| Figure 7 – Starting position for obstacle avoidance test .....                     | 18 |
| Figure 8 – Wire fastening configuration .....                                      | 20 |
| Figure 9 – Floor circle marks schematic diagram .....                              | 20 |
| Figure 10 – Floor circle marks schematic diagram with robot .....                  | 21 |
| Figure 11 – Top view of cable traversing behaviour Configuration .....             | 21 |
| Figure 12 – Side view of cable traversing behaviour Configuration .....            | 22 |
| Figure A.1 – Details of obstacles around table.....                                | 23 |
| Figure A.2 – Illustration of metal transition installation .....                   | 25 |
| Figure A.3 – Illustration of wood transition Installation .....                    | 25 |
| Figure A.4 – Detail view of checker board and transitions .....                    | 26 |
| Figure A.5 – Illustration of four-panel door.....                                  | 26 |
| Table 1 – Tolerance of linear dimension (from ISO 2768-1).....                     | 10 |
| Table 2 – Tolerance of external radius and chamfer heights (from ISO 2768-1) ..... | 10 |
| Table A.1 – Dimensions of furniture and obstacles .....                            | 24 |

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PERFORMANCE EVALUATION METHODS  
OF MOBILE HOUSEHOLD ROBOTS**

## 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.

International Standard IEC 62849 has been prepared by IEC technical committee 59: Performance of household and similar electrical appliances.

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

| FDIS        | Report on voting |
|-------------|------------------|
| 59/655/FDIS | 59/656/RVD       |

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

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

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

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

**IMPORTANT – The 'colour inside' logo on the cover page of this publication 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.**

## INTRODUCTION

This standard will cover the generic performance test methods for mobile household robots within one document. However this current version is applicable for indoor floor supported wheeled or wheel-track robots with focus on mobility and power consumption related performance. As the needs for manipulation related performance grows, it will be added into this generic performance standard.

## PERFORMANCE EVALUATION METHODS OF MOBILE HOUSEHOLD ROBOTS

### 1 Scope

This International Standard applies to mobile household robots and provides performance testing and evaluation methods for common features of various mobile household robots.

This standard is neither concerned with safety nor with 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 TS 62885-1, *Surface cleaning appliances – Part 1: General requirements on test material and test equipment*

IEC 62929:2014, *Cleaning robots for household use – Dry cleaning: Methods of measuring performance*

ISO 554, *Standard atmospheres for conditioning and/or testing – Specifications*

ISO 2768-1:1989, *General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**