

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Off grid and unreliable grid refrigerating appliances for domestic and light commercial use - Characteristics and test methods - Performance requirements and energy consumption

Document Preview

Appareils de réfrigération hors réseau et sur réseau peu fiable pour un usage domestique et commercial léger - Caractéristiques et méthodes d'essai -

Exigences d'aptitude à la fonction et consommation d'énergie



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 Varembe
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 It also gives information on projects, replaced and withdrawn publications.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	5
INTRODUCTION	7
1 Scope	8
2 Normative references	9
3 Terms and definitions	9
3.1 General	10
3.2 Unreliable grid supply	11
3.3 Off grid supply	12
3.4 Technical	13
3.5 Compartments	13
3.6 Performance characteristics	15
4 Categorization of refrigerating appliances in scope	16
5 Compartment storage temperature specifications	17
5.1 General	17
5.2 Calculation of T_{C_min} , T_{C_max} and T_{cm} for refrigerating appliances with a vertical door	18
5.3 Calculation of T_{C_min} , T_{C_max} and T_{cm} for refrigerating appliances with a horizontal door or lid	19
6 Instruments, accuracy and precision of measurements	20
6.1 General	20
6.2 Electrical energy consumption	20
6.3 Humidity	20
6.4 Length	20
6.5 Mass	20
6.6 Temperature	21
6.7 Time	21
6.8 Voltage and frequency	21
6.9 Maximum current	21
6.10 DC power supply	21
7 General test conditions	21
7.1 General	21
7.2 Ambient temperatures	22
7.2.1 Sensors	22
7.2.2 Temperature stability	22
7.2.3 Climate classes	22
7.3 Ambient relative humidity	23
7.4 Test room configuration	23
7.4.1 Platform	23
7.4.2 Rear wall or partition	23
7.4.3 Side partitions	23
7.4.4 Sensor location	24
7.4.5 Test room general configuration	24
7.5 Electricity supply	25
7.5.1 General	25
7.5.2 AC supply unreliable grid	26
7.5.3 DC supply off grid	29

7.5.4	AC/DC supply for hybrid refrigerating appliances.....	32
8	Preparation of an appliance for testing and general procedures.....	32
8.1	General	32
8.2	Running in of new appliances	32
8.3	Installation of the appliance in the test room.....	32
8.3.1	General.....	32
8.3.2	Rear clearance	32
8.4	Setting up	32
8.4.1	General.....	32
8.5	Variable temperature compartment.....	33
8.6	Pre-test condition	33
8.6.1	General.....	33
8.6.2	Refrigerating appliances without an electrical battery to supply the compressor	33
8.6.3	Off grid battery supported solar refrigerating appliances	36
9	Location of compartment temperature sensors.....	38
9.1	General	38
9.2	Overview	38
9.3	Compartment with a vertical door	38
9.4	Compartment with a horizontal door or lid	39
10	Volume.....	41
10.1	General	41
10.2	Test procedure.....	42
10.2.1	Volume measurements.....	42
10.2.2	Determination of volume.....	42
10.2.3	Volume of evaporator space.....	42
11	Maximum current test.....	43
11.1	General	43
11.2	Test procedure.....	43
12	Pull down test	44
12.1	General	44
12.2	Test procedure.....	44
12.3	Data to record and report	45
13	Water cooling test.....	45
13.1	General	45
13.2	Load.....	45
13.3	Test procedure.....	47
13.4	Data to record and report	48
14	Water freezing test	48
14.1	General	48
14.2	Load.....	48
14.3	Test procedure.....	50
14.4	Data to record and report	50
15	Energy consumption test	50
15.1	General	50
15.2	Test procedure.....	51
15.3	Data to record and report	51

16	High ambient storage and energy consumption test (only valid for ST and T appliances)	52
16.1	General	52
16.2	Test procedure	52
16.3	Data to record and report	52
17	Low ambient storage test	52
17.1	General	52
17.2	Test procedure	52
17.3	Data to record and report	53
18	Holdover test	53
18.1	General	53
18.2	Test procedure	53
18.3	Data to record and report	54
19	Solar class test	54
19.1	General	54
19.2	Test procedure	54
19.3	Data to record and report	55
20	Under and over voltage test	55
20.1	General	55
20.2	Test procedure	55
20.3	Data to record and report for the under and for the over voltage test	56
21	Voltage withstand test	56
21.1	General	56
21.2	Test procedure	57
21.3	Data to record and report	57
22	Polarity check test	57
22.1	General	57
22.2	Test procedure	57
22.3	Data to record and report	57
23	Summary of compartment load, electrical battery state and thermal store conditions	57
24	Marking	58
24.1	Rating plate information	58
24.2	Identification of frozen compartments	59
24.3	Load limit lines	59
Annex A (informative)	Background information and arguments for the standard	61
A.1	Background	61
A.2	Rationale	62
Annex B (informative)	Test points solar classes	63
Annex C (informative)	Recommendations for future standard updates	66
Bibliography		67
Figure 1	– Example calculation of T_{C_min} and T_{C_max} for refrigerating appliances with a vertical door	19
Figure 2	– Example calculation of T_{C_min} and T_{C_max} for refrigerating appliances with a horizontal door or lid	20
Figure 3	– Verification of parameters to be kept constant	22

Figure 4 – Partitions to restrict air circulation and ambient temperatures sensor positions.....	25
Figure 5 – AC supply signals	28
Figure 6 – Daily solar class supply signals	30
Figure 7 – Daily functional supply signal	31
Figure 8 – Pre-test condition A – Example 1: applying an intermittent supply class 4 supply signal.....	34
Figure 9 – Pre-test condition A– Example 2: applying an intermittent supply class 5 supply signal.....	34
Figure 10 – Pre-test condition B for holdover test – Example 1.....	35
Figure 11 – Pre-test condition B for holdover test – Example 2.....	35
Figure 12 – Pre-test condition C – Example 1: applying an intermittent supply class 4 supply signal.....	36
Figure 13 – Pre-test condition C – Example 2: applying an intermittent supply class 5 supply signal.....	37
Figure 14 – Pre-test condition D for holdover test – Example 1.....	37
Figure 15 – Pre-test condition D for holdover test – Example 2.....	38
Figure 16 – Location of temperature sensors vertical door refrigerating appliances	39
Figure 17 – Location of temperature sensors horizontal door or lid refrigerating appliances	41
Figure 18 – Basic view of top mounted freezer appliance.....	43
Figure 19 – Load and position of the water and M-containers on each shelf for appliances with a vertical door and on the dummy shelf for horizontal appliances with a dummy shelf (water cooling test).....	46
Figure 20 – Load and position of the M-containers on the shelf (water freezing test).....	49
Figure 21 – Star identification symbols for frozen compartments	59
Figure 22 – Marking of load limit	60

Table 1 – Unreliable grid refrigerating appliance categories and their configuration codes	17
--	----

Table 2 – Off grid refrigerating appliance categories and their configuration codes	17
---	----

Table 3 – Compartment temperature specification.....	18
Table 4 – Climate classes	22
Table 5 – Ambient test conditions.....	23
Table 6 – AC unreliable grid supply signals	27
Table 7 – Intermittent AC voltage supply class	27
Table 8 – AC voltage distorted supply class	28
Table 9 – AC voltage withstand supply class	29
Table 10 – DC off grid supply signals	29
Table 11 – Current of the functional supply	30
Table 12 – Functional supply signal.....	31
Table 13 – Intermittent DC voltage supply class.....	32
Table 14 – Testing days energy consumption test.....	51
Table 15 – Testing days solar class test	55
Table 16 – Compartment load, electrical battery condition and thermal store state at the start of each test.....	58
Table B.1 – Coordinates of the irradiance graphs for the various solar classes	64

INTERNATIONAL ELECTROTECHNICAL COMMISSION

Off grid and unreliable grid refrigerating appliances for domestic and light commercial use - Characteristics and test methods - Performance requirements and energy consumption

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 63437 has been prepared by subcommittee 59M: Performance of electrical household and similar cooling and freezing appliances, of IEC technical committee 59: Performance of household and similar electrical appliances. It is an International Standard.

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

Draft	Report on voting
59M/193/FDIS	59M/195/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.