



NEGARA BRUNEI DARUSSALAM

**BRUNEI DARUSSALAM STANDARD  
PIAWAI BRUNEI DARUSSALAM**

**PBD IEC 60335-2-24:2008**

**IEC 60335-2-24:2008**

**Edition 6.2**

**HOUSEHOLD & SIMILAR ELECTRICAL APPLIANCES –  
SAFETY PART 2-24: PARTICULAR REQUIREMENTS FOR  
REFRIGERATING APPLIANCES, ICE-CREAM APPLIANCES  
& ICE-MAKER**

---

**ENERGY DIVISION, PRIME MINISTER'S OFFICE  
IN COLLABORATION WITH MINISTRY OF DEVELOPMENT  
NEGARA BRUNEI DARUSSALAM**

## **FOREWORD**

This Brunei Darussalam Electrical Standard was prepared by the Technical Committee on Electrical Standards [TECO (Electrical)], Energy Division at Prime Minister's Office in collaboration with the authority of the standards committee, Construction Planning and Research Unit (CPRU), Ministry of Development, Brunei Darussalam with the objective of developing the National Electrical Standards for electrical products, systems, equipment and facilities for the local industries and consumers with reference to international standards, guidelines and procedures. In developing the national electrical standards, the aim is to promote quality, technical integrity, health, safety and environmental standards for the local industries and consumers.

This Brunei Darussalam Electrical Standard is an adoption of the International Electro technical Commission IEC 60335-2-24: 2008 (Edition 6.2) standard and implements it as the Brunei Darussalam National Standard.

Attention is drawn to the fact that this Brunei Darussalam Electrical Standard does not confer any immunity from legal obligations in any contract for compliance to the Standard.

The National Electrical Standards are subject to periodical review according to the current needs of the local industries and consumers to keep abreast of progress in the industries and consumers concerned. Suggestions of amendments will be recorded and in due course brought to the notice of the committees concerned.

## **COMMITTEE MEMBERS**

The Technical Committee on Electrical Standards [TECO (Electrical)] was tasked by the Energy Division at the Prime Minister's Office in collaboration with Construction Planning and Research Unit (CPRU), Ministry of Development, Brunei Darussalam for the preparation of this Brunei Darussalam Electrical Standard. The members of the Technical Committee are as follows:

- |   |  |
|---|--|
| 1. Awg Haji Abd Shawal Yaman<br>(Chairman)        | Energy Division, Prime Minister's Office                     |
| 2. Awg Liaw Wai Khiong<br>(Co-Chairman)           | Brunei LNG Sdn Bhd   |
| 3. Pg Shahrudin Pg Haji Yusoff<br>(Secretary)     | CPRU, Ministry of Development                                |
| 4. Awg William Voon<br>(Assistant Secretary 1)    | Institution of Engineering and Technology,<br>Brunei Network |
| 5. Awg Simon K A Leong<br>(Assistant Secretary 2) | KR Kamarulzaman & Associates                                 |
| 6. Awg Haji Md Azrul Azrin Hj Md Zain             | Energy Division, Prime Minister's Office                     |
| 7. Awg Musa Metali                                | Department of Electrical Services, PMO                       |
| 8. Awg Md Amir Sharifuddin Haji Ali               | Department of Electrical Services, PMO                       |
| 9. Dyg Hajah Norhayati Ahmad                      | Department of Electrical Services, PMO                       |
| 10. Awg Majid Ali                                 | Ministry of Industry & Primary Resources                     |
| 11. Awg Dennis Wong Tet Yin                       | Department of Mechanical & Electrical, PWD                   |
| 12. Awg Nohi Irwan Surkarki Haji Pawi             | Department of Fire & Rescue Services                         |
| 13. Awg Martin Blundell                           | University Brunei Darussalam                                 |
| 14. Awg Haji Morsidi Haji Kassim                  | Institut Teknologi Brunei                                    |
| 15. Awg Haji Ismit Haji Mohamad                   | Institut Teknologi Brunei                                    |
| 16. Awg Matyassin Haji Masri                      | Maktab Kejuruteraan Jefri Bolkiah                            |
| 17. Awg Sylvester Kong                            | Brunei Shell Petroleum Co. Sdn Bhd                           |
| 18. Dyg Seri Malati OKIP Hj Zolkeflee             | Brunei Shell Petroleum Co. Sdn Bhd                           |
| 19. Awang Aristoteles Momin                       | Brunei LNG Sdn Bhd   |

20. Steve Turner	Berakas Power Management Company
21. Caius Yong	Berakas Power Management Company
22. Awg Rick Liaw	Hamzah Hassan Consultant
23. Awg Kyaw Moe Aung	HSE Engineering Sdn Bhd
24. Awg Khairul Ezam bin Haji Mohd. Zain	CPRU, Ministry of Development

INTERNATIONAL  
STANDARD

60335-2-24

Edition 6.2

2007-03

Edition 6:2002 consolidated with amendments 1:2005 and 2:2007

---

---

Household and similar electrical appliances –  
Safety –

Part 2-24:  
Particular requirements for refrigerating  
appliances, ice-cream appliances and ice-makers



Reference number  
CEI/IEC 60335-2-24:2002+A1:2005+A2:2007

PBD IEC 60335-2-24:2008 (Published by IEC in 2007)  
This IEC International Standard has been adopted by CPRU, Ministry of Development,  
Negara Brunei Darussalam as a national standard under the IEC Affiliate Country Programme

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references .....	8
3 Definitions .....	8
4 General requirement.....	10
5 General conditions for the tests .....	10
6 Classification.....	12
7 Marking and instructions.....	13
8 Protection against access to live parts.....	16
9 Starting of motor-operated appliances .....	16
10 Power input and current .....	16
11 Heating .....	17
12 Void.....	20
13 Leakage current and electric strength at operating temperature.....	20
14 Transient overvoltages .....	21
15 Moisture resistance .....	21
16 Leakage current and electric strength.....	22
17 Overload protection of transformers and associated circuits .....	23
18 Endurance.....	23
19 Abnormal operation .....	23
20 Stability and mechanical hazards .....	26
21 Mechanical strength .....	28
22 Construction .....	29
23 Internal wiring.....	37
24 Components .....	38
25 Supply connection and external flexible cords .....	39
26 Terminals for external conductors.....	40
27 Provison for earthing .....	40
28 Screws and connections .....	40
29 Clearances, creepage distances and solid insulation .....	41
30 Resistance to heat and fire.....	41
31 Resistance to rusting.....	41
32 Radiation, toxicity and similar hazards.....	41
Annexes .....	44
Bibliography.....	52

Figure 101 – Apparatus for spillage test.....	42
Figure 102 – Detail of scratching tool tip.....	43
Figure AA.1 – Supply circuit for locked-rotor test of a single-phase fan motor.....	46
Figure BB.1 – Diagram of apparatus for water evaporation for accumulation of frost.....	48
Figure BB.2 – Apparatus for water evaporation and for accumulation of frost.....	49
Table 101 – Maximum temperatures for motor-compressors.....	19
Table 102 – Refrigerant flammability parameters.....	36

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
SAFETY –

Part 2-24: Particular requirements for refrigerating appliances,  
ice-cream appliances and ice-makers

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.

This part of International Standard IEC 60335 has been prepared by subcommittee 61C: Household appliances for refrigeration, of IEC technical committee 61: Safety of household and similar electrical appliances.

This consolidated version of IEC 60335-2-24 is based on the sixth edition (2002) [documents 61C/213/FDIS and 61C/216/RVD], its amendment 1 (2005) [documents 61C/291/FDIS and 61C/302/RVD] and its amendment 2 (2007) [documents 61C/385/FDIS and 61C/390/RVD].

It bears the edition number 6.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

The French version of this standard has not been voted upon.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When "Part 1" is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for electric refrigerating appliances, ice-cream appliances and ice-makers.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

- requirements: in roman type;
- test specifications: in italic type;
- notes: in smaller roman type.

Words in bold in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and the associated noun are also in bold.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result 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,
- replaced by a revised edition, or
- amended.

## INTRODUCTION

It has been assumed in the drafting of this international standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice and takes into account the way in which electromagnetic phenomena can affect the safe operation of appliances.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

When a part 2 standard does not include additional requirements to cover hazards dealt with in Part 1, Part 1 applies.

NOTE 1 This means that the technical committees responsible for the part 2 standards have determined that it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

NOTE 2 Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IEC 60335 series of standards. For example, in the case of temperature requirements for surfaces on many appliances, generic standards, such as ISO 13732-1 for hot surfaces, are not applicable in addition to Part 1 or part 2 standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
SAFETY –****Part 2-24: Particular requirements for refrigerating appliances,  
ice-cream appliances and ice-makers****1 Scope**

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of the following appliances, their rated voltage being not more than 250 V for single-phase appliances, 480 V for other appliances and 24 V d.c. for appliances when battery operated.

- refrigerating appliances for household and similar use;
- ice-makers incorporating a motor-compressor and ice-makers intended to be incorporated in frozen food storage compartments;
- refrigerating appliances and ice-makers for use in camping, touring caravans and boats for leisure purposes.

These appliances may be operated from the mains, from a separate battery or operated either from the mains or from a separate battery.

This standard also deals with the safety of ice-cream appliances intended for household use, their rated voltage being not more than 250 V for single-phase appliances and 480 V for other appliances.

It also deals with compression-type appliances for household and similar use, which use flammable refrigerants.

This standard does not cover features of the construction and operation of those refrigerating appliances which are dealt with in ISO standards.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account

- persons (including children) whose
  - physical, sensory or mental capabilities; or
  - lack of experience and knowledgeprevents them from using the appliance safely without supervision or instruction;
- children playing with the appliance.

NOTE 1 Attention is drawn to the fact that

- for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary;
- in many countries, additional requirements are specified by national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.