



TECHNICAL SPECIFICATION



Refrigerant detection systems for flammable refrigerants

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 23.120

ISBN 978-2-8322-9545-8

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 General requirement.....	7
5 Test gases and default test conditions	8
6 Response time of the refrigerant detection system.....	9
7 Refrigerant detection system calibration and short-term stability.....	10
8 Selectivity test and poisoning test.....	10
9 Refrigerant poisoning and oil spray test.....	11
9.1 General.....	11
9.2 Test set-up	12
9.3 Test procedure.....	14
9.4 Check of alarm set point and response time.....	14
10 Long term stability	15
11 Humidity test	15
12 Temperature test	15
13 Vibration requirements	16
14 Ignition test	17
15 Refrigerant detection system self-test routine	17
16 Serviceability	17
17 Refrigerant sensor identification	17
Bibliography.....	18
Figure 1 – Example of test chamber design	13
Table 1 – Relationship among alarm set point, tolerance and test gas (informative).....	9
Table 2 – Gas and vapour concentrations	11
Table 3 – Example of the test chamber design.....	14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

REFRIGERANT DETECTION SYSTEMS FOR FLAMMABLE REFRIGERANTS

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 TS 63542 has been prepared by subcommittee 61D: Appliances for air-conditioning for household and similar purposes, of IEC technical committee 61: Safety of household and similar electrical appliances. It is a Technical Specification.

This first edition is based on Annex LL of IEC 60335-2-40:2022:

- Clause 4 – based on Clause LL.1, but without the 1st paragraph. An additional last paragraph has been added to link to relevant application standards;
- Clause 5 – based on Clause LL.2. An introductory sentence has been added to link to test conditions in the relevant application standard;
- Clause 6 – based on Clause LL.3;
- Clause 7 – based on Clause LL.4;
- Clause 8 – based on Clause LL.5;
- Clause 9 – based on Clause LL.6;

- Clause 10 – based on Clause LL.7;
- Clause 11 – based on Clause LL.8;
- Clause 12 – based on Clause LL.9;
- Clause 13 – based on Clause LL.10;
- Clause 14 – based on Clause LL.11;
- Clause 15 – based on Clause LL.12;
- Clause 16 – based on Clause LL.13;
- Clause 17 – based on Clause LL.14.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
61D/531/DTS	61D/534/RVDTS

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 Technical Specification 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.

NOTE The following print types are used:

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

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

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

- reconfirmed,
- withdrawn, or
- revised.

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

INTRODUCTION

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

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

A refrigerant detection systems employing materials or having forms of construction differing from those detailed in the requirements of this document 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 this document.

REFRIGERANT DETECTION SYSTEMS FOR FLAMMABLE REFRIGERANTS

1 Scope

This document applies to **refrigerant detection systems** for use in appliances complying with a relevant standard of the IEC 60335 series using **flammable refrigerants**.

Relevant standards of the IEC 60335-series include:

- IEC 60335-2-40, Household and similar electrical appliances – Safety – Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers
- IEC 60335-2-89, Household and similar electrical appliances – Safety – Part 2-89: Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor
- IEC 60335-2-104, Household and similar electrical appliances – Safety – Part 2-104: Particular requirements for appliances to recover and/or recycle refrigerant from air conditioning and refrigeration equipment
- IEC 60335-2-118, Household and similar electrical appliances – Safety – Part 2-118: Particular requirements for professional ice-cream makers

This document does not take into account refrigerants other than group A2L, A2 and A3 as defined by ISO 817.

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 60335-2-40:2022, *Household and similar electrical appliances – Safety – Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers*

IEC 60335-2-89, *Household and similar electrical appliances – Safety – Part 2-89: Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor*

IEC 60335-2-104, *Household and similar electrical appliances – Safety – Part 2-104: Particular requirements for appliances to recover and/or recycle refrigerant from air conditioning and refrigeration equipment*

IEC 60335-2-118, *Household and similar electrical appliances – Safety – Part 2-118: Particular requirements for professional ice-cream makers*

ISO 817, *Refrigerants – Designation and safety classification*

ISO 7000:2004, *Graphical symbols for use on equipment – Registered symbols*