
**Refrigerating systems and heat
pumps — Safety and environmental
requirements —**

Part 1:
**Definitions, classification and
selection criteria**

*Systèmes frigorifiques et pompes à chaleur — Exigences de sécurité et
d'environnement —*

Partie 1: Définitions, classification et critères de choix

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
3.1 Refrigerating system.....	2
3.2 Location.....	3
3.3 Pressure.....	4
3.4 Components of refrigerating system.....	5
3.5 Piping, joint, and fitting.....	6
3.6 Safety device.....	7
3.7 Fluid.....	9
3.8 Heat transfer circuit.....	10
3.9 Refrigerant disposal.....	10
3.10 Miscellaneous.....	11
4 Abbreviated terms	11
5 Classification	12
5.1 Occupancies classification.....	12
5.2 Systems classification.....	12
5.3 Location classification of refrigerating systems.....	17
5.4 Refrigerant classification.....	18
6 Quantity of refrigerant per occupied space	18
7 Space volume calculations	18
8 Heat-transfer fluid	19
8.1 General.....	19
8.2 Ingestion.....	19
8.3 Water and soil contamination.....	19
8.4 Personal exposure (toxicity).....	19
8.5 Pressure.....	19
8.6 Marking.....	19
8.7 Freezing point.....	19
8.8 Decomposition point.....	20
8.9 Flash point.....	20
8.10 Auto-ignition temperature.....	20
8.11 Thermal expansion.....	20
8.12 Corrosion protection.....	20
Annex A (normative) Location of refrigerating systems	21
Annex B (normative) Safety classification and information about refrigerants	30
Annex C (informative) Potential hazards for refrigerating systems	40
Annex D (informative) Equivalent terms in English and French	42
Bibliography	45

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 1, *Safety and environmental requirements for refrigerating systems*.

ISO 5149-1, together with ISO 5149-2, ISO 5149-3, and ISO 5149-4, cancels and replaces ISO 5149:1993, which has been technically revised.

ISO 5149 consists of the following parts, under the general title *Refrigerating systems and heat pumps — Safety and environmental requirements*:

- *Part 1: Definitions, classification and selection criteria*
- *Part 2: Design, construction, testing, marking and documentation*
- *Part 3: Installation site*
- *Part 4: Operation, maintenance, repair and recovery*

Introduction

The purpose of this International Standard is to promote the safe design, construction, disposal, installation, and operation of refrigerating systems.

The industry response to the chlorofluorocarbon (CFC) issue has accelerated the introduction of alternative refrigerants. The entry of new refrigerants and blends in the market and the introduction of new safety classifications prompted the revision of this International Standard.

This International Standard is directed to the safety of persons and property on or near the premises where refrigeration facilities are located. It includes specifications for fabricating a tight system.

This International Standard is intended to minimize possible hazards to persons, property, and environment from refrigerating systems and refrigerants. These hazards are essentially associated with the physical and chemical characteristics of refrigerants as well as the pressures and temperatures occurring in the refrigeration cycles (see [Annex A](#)).

Attention is drawn to hazards common to all compression systems, such as high temperature at discharge, liquid slugging, erroneous operation, or reduction in mechanical strength caused by corrosion, erosion, thermal stress, fatigue stresses, liquid hammer, or vibration.

Corrosion, however, should have special consideration as specific conditions to refrigerating systems arise due to the alternate frosting and defrosting or the covering of equipment by insulation.

Commonly used refrigerants except R-717 are heavier than air. Care should be taken to avoid stagnant pockets of heavy refrigerant vapours by proper location of ventilation inlet and exhaust openings. All machinery rooms are required to have mechanical ventilation controlled by oxygen deficiency alarms or refrigerant vapour alarms.

Refrigerating systems and heat pumps — Safety and environmental requirements —

Part 1: Definitions, classification and selection criteria

1 Scope

This International Standard specifies the requirements for the safety of persons and property, provides guidance for the protection of the environment, and establishes procedures for the operation, maintenance, and repair of refrigerating systems and the recovery of refrigerants.

This part of ISO 5149 specifies the classification and selection criteria applicable to the refrigerating systems and heat pumps. These classification and selection criteria are used in ISO 5149-2, ISO 5149-3, and ISO 5149-4.

This part of ISO 5149 applies to:

- a) refrigerating systems, stationary or mobile, of all sizes including heat pumps;
- b) secondary cooling or heating systems;
- c) the location of the refrigerating systems;
- d) replaced parts and added components after adoption of this part of ISO 5149 if they are not identical in function and in the capacity.

This part of ISO 5149 applies to fixed or mobile systems, except to vehicle air conditioning systems covered by a specific product standard, e.g. ISO 13043 and SAE J 639.

This part of ISO 5149 is applicable to new refrigerating systems, extensions or modifications of already existing systems, and for used systems, being transferred to and operated on another site.

This part of ISO 5149 also applies in the case of the conversion of a system to another refrigerant.

[Annex A](#) specifies the limits for the quantity of refrigerant charge permitted in systems in various locations and occupancy classes.

[Annex B](#) specifies the criteria for safety and environmental considerations of different refrigerants used in refrigeration and air conditioning.

Systems containing refrigerants which are not listed in ISO 817 are not covered in this part of ISO 5149.

2 Normative references

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.

ISO 817:2014, *Refrigerants — Designation and safety classification*

ISO 5149-2:2014, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 817 and the following apply.

3.1 Refrigerating system

3.1.1

absorption system

refrigerating system in which refrigeration is effected by evaporation of a refrigerant, the vapour then being absorbed or adsorbed by an absorbent or adsorbent medium, respectively, from which it is subsequently expelled at a higher partial vapour pressure by heating and then liquefied by cooling

3.1.2

cascade system

two or more independent refrigerant circuits where the condenser of one system rejects heat directly to the evaporator of another

3.1.3

direct releasable system

system with one degree of separation from an occupied space

Note 1 to entry: Systems in which the secondary coolant is in contact with the air or the goods to be cooled or heated (e.g. spray systems) are direct releasable systems.

Note 2 to entry: For the purpose of this part of ISO 5149, direct and indirect systems are defined with respect to the potential to leak refrigerant into an occupied space. When the system does not serve an occupied space, it can be classed as direct or indirect depending on the system design.

3.1.4

indirect system

systems with more than one degree of separation from the occupied space

3.1.5

double indirect system

indirect system for which the heat-transfer medium passes through a second heat exchanger located externally to the space, and cools or heats a second heat-transfer medium fluid, which is brought into direct contact with the substance concerned (e.g. by sprays or similar means)

3.1.6

limited charge system

refrigerating system in which the internal volume and total refrigerant charge are such that, with the system idle, the allowable pressure is not exceeded when complete evaporation of the refrigerant occurs

3.1.7

high-pressure side

part of a refrigerating system operating approximately at the condenser pressure

3.1.8

low-pressure side

part of a refrigerating system operating approximately at the evaporator pressure