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Title: Draft BS EN 378-1 Refrigerating systems and heat pumps - Safety and environmental requirements. Part 1: Basic requirements, definitions, classification and selection criteria.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

English Version

Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Basic requirements, definitions, classification and selection criteria

Systèmes frigorifiques et pompes à chaleur - Exigences de sécurité et d'environnement - Partie 1 : Exigences de base, définitions, classification et critères de choix

Kälteanlagen und Wärmepumpen - Sicherheitstechnische und umweltrelevante Anforderungen - Teil 1: Grundlegende Anforderungen, Begriffe, Klassifikationen und Auswahlkriterien

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 182.

If this draft becomes a European Standard, CEN 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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 378-1:2025) has been prepared by Technical Committee CEN/TC 182 "Refrigerating systems, safety and environmental requirements", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede [\[1\]](#).

prEN 378-1:2025 includes the following significant technical changes with respect to [\[1\]](#):

- [Clause 5](#) was restructured.
- The examples of systems were removed from [Clause 5](#),
- Clause 6 and Clause 7 were combined to a new [Clause 6](#).
- Annex C (Location and refrigerant charge limitations) was converted into a new [Clause 7](#) of the main body of the standard (Determining the releasable quantity of refrigerant and the refrigerant quantity safety limit).
- The concept of releasable quantity of refrigerant was introduced in a new subclause [7.2](#).
- Options for calculation of refrigerant quantity safety limits were introduced in a new subclause [7.5](#).
- Additional requirements for spaces below ground are introduced in new subclause [7.6](#).
- Annex E was converted into a new [\[2\]](#).
- Annex H with examples related to Annex C were converted to and informative [Annex F](#) with examples related to [7.5](#).
- Examples related to Clause 5 were given in a new [Annex C](#).
- Annex F and Annex G were named [Annex D](#) and [Annex E](#).
- New informative [Annex G](#) for assumed mass flow rates.
- New informative [Annex H](#) for test and calculation methods for determining releasable charge m_{rc} .
- New normative [Annex I](#) for refrigerant quantity safety limit or minimum room area determination using surrounding concentration test.
- New normative [Annex J](#) for calculations for refrigerant-containing parts are within an enclosure with openings.
- New normative [Annex K](#) for stagnation effect with of higher molar mass refrigerants

[\[3\]](#) consists of the following parts under the general title "Refrigerating systems and heat pumps — Safety and environmental requirements":

- *Part 1: Basic requirements, definitions, classification and selection criteria;*
- *Part 2: Design, construction, testing, marking and documentation;*
- *Part 3: Installation site and personal protection;*
- *Part 5: Safety classification and information about refrigerants.*

[\[4\]](#) applies for operation, maintenance, repair and recovery.

Introduction

This document relates to safety and environmental requirements in the design, manufacture, construction, installation, operation, maintenance, repair and disposal of refrigerating systems regarding local and global environments. It does not relate to the final destruction of the refrigerants.

It is intended to minimize possible hazards to persons, property and the environment from refrigerating systems and refrigerants. These hazards are associated with the physical and chemical characteristics of refrigerants and the pressures and temperatures occurring in refrigeration cycles.

Attention is drawn to hazards such as excessive temperature at compressor discharge, liquid slugging, erroneous operation and reduction in mechanical strength caused by corrosion, erosion, thermal stress, liquid hammer or vibration. Corrosion deserves special consideration as conditions peculiar to refrigerating systems arise due to alternate frosting and defrosting or the covering of equipment by insulation.

The extent to which hazards are covered is indicated in [Annex E](#). In addition, machinery should comply as appropriate with [\[5\]](#) for hazards which are not covered by this document.

Commonly used refrigerants except R717 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. Refrigerants and their combinations with oils, water or other substances, can affect the system chemically and physically. They can, if they have detrimental properties, endanger persons, property and the environment when escaping from the refrigerating system. Refrigerants are selected with due regard to their potential influence on the global environment (ODP, GWP) as well as their possible effects on the local environment. Evaluation of the environmental performance requires a life cycle approach. With regard to global climate change the **T**otal **E**quivalent **W**arming **I**mpact approach is generally used as the basis (see [Annex B](#)). Reference should be made to the [\[6\]](#) to address other environmental aspects. Many factors influence environmental impacts such as:

- location of the system;
- energy efficiency of the system;
- type of refrigerant;
- service frequency;
- refrigerant leaks;
- sensitivity of charge on efficiency;
- minimization of heat load;
- control methods.

Additional investments may be directed towards reducing leaks, increasing energy efficiency or modifying the design in order to use a different refrigerant. A life cycle approach is necessary to identify where additional investments will have the most beneficial effects.

1 Scope

This document 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.

The term “refrigerating system” used in this document includes heat pumps.

This part of EN 378 specifies the classification and selection criteria applicable to refrigerating systems. These classification and selection criteria are used in Parts 2, 3 and 5.

This document applies to:

- a) refrigerating systems, stationary or mobile, of all sizes except to vehicle air conditioning systems covered by a specific product standard e.g. [7];
- b) secondary cooling or heating systems;
- c) the location of the refrigerating systems;
- d) replaced parts and added components after adoption of this document if they are not identical in function and in the capacity.

Systems using refrigerants other than those listed in Part 5 of this standard are not covered by this document.

[Clause 7](#) specifies how to determine the refrigerant quantity safety limit in a given space, which, when exceeded, requires additional protective measures to reduce the risk.

This document is not applicable to refrigerating systems which were manufactured before the date of its publication as a European Standard except for extensions and modifications to the system which were implemented after publication.

This document is applicable to new refrigerating systems, extensions or modifications of already existing systems, and for existing stationary systems, being transferred to and operated on another site.

This document also applies in the case of the conversion of a system to another refrigerant type, in which case conformity to the relevant clauses of Parts 1, 2, 3 and 5 of the standard is expected to be assessed.

Product family standards dealing with the safety of refrigerating systems take precedence over horizontal and generic standards covering the same subject.

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.

ISO 5149-4:2022, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*

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

EN 378-3, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site and personal protection*

prEN 378-3 rev, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site and personal protection*

EN 378-4:2016, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 4: Operation, maintenance, repair and recovery*

prEN 378-5, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 5: Safety classification and information about refrigerants*

EN 14276-2:2020, *Pressure equipment for refrigerating systems and heat pumps - Part 2: Piping - General requirements*

EN 14624:2020, *Performance of portable locating leak detectors and of fixed gas detectors for all refrigerants*

EN ISO 14903:2017, *Refrigerating systems and heat pumps - Qualification of tightness of components and joints (ISO 14903:2017)*

EN ISO 22712:2023, *Refrigerating systems and heat pumps - Competence of personnel (ISO 22712:2023)*

EN IEC 60079-10-1:2021, *Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres*

EN IEC 60335-2-89:2022, *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*

prEN 378-3:2025, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site and personal protection*

prEN 378-5:2024, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 5: Safety classification and information about refrigerants*

prEN 378-5:2026 *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 5: Safety classification and information about refrigerants*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE See informative [Annex A](#) for equivalent terms in English, French and German.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 Refrigerating systems

3.1.1

refrigerating system

heat pump

combination of interconnected refrigerant-containing parts constituting one closed circuit in which the refrigerant is circulated for the purpose of extracting and delivering heat (i.e. cooling and heating)

3.1.2

self-contained system

complete factory-made refrigerating system in a suitable frame and/or enclosure, that is fabricated and transported complete, or in two or more sections and in which no refrigerant-containing parts are connected on site other than by isolation valves, such as companion valves

3.1.3

unit system

self-contained system that has been assembled, filled ready for use and tested prior to its installation and is installed without the need for connecting any refrigerant-containing parts

Note 1 to entry: A unit system can include factory assembled companion valves.

3.1.4

limit charged system

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

3.1.5

sorption 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

3.1.6

secondary cooling or heating system

system employing a fluid which transfers heat from the product or spaces to be cooled or heated or from another cooling or heating system to the refrigerating system without compression and expansion of the fluid

3.1.7

sealed system

refrigerating system in which all refrigerant containing parts are made tight by welding, brazing or a similar permanent connection which may include capped valves and capped service ports that allow proper repair or disposal, and which have a tested leakage rate of less than 3 grams per year under a pressure of at least a quarter of the maximum allowable pressure

Note 1 to entry: Joints based on mechanical forces which are prevented from improper use by the need of a special tool (e.g. by glue) are considered as a similar permanent connection.

Note 2 to entry: Hermetically sealed systems in [\[8\]](#) are equivalent to sealed systems in EN378-2.

3.1.8

technically tight system

refrigerating system or part of system which meets the specified level of tightness

Note 1 to entry: The specified level of tightness is the level of tightness tested in accordance with the requirements for tightness testing in Clause 6 of [\[9\]](#).

3.1.9

durably technically tight system

refrigerating system or part of system that is shown to be technically tight and that remains technically tight due to its design, or the technical tightness of which is ensured by means of maintenance and supervision

Note 1 to entry: A refrigerating system or part of system is shown to be technically tight by testing according to Clause 6 of [\[9\]](#).

Note 2 to entry: No release is to be expected from equipment that is durably technically tight.

Note 3 to entry: Equipment that is durably technically tight does not cause any hazardous areas in its surroundings while it is closed.

Note 4 to entry: Durably technically tight equipment includes for example semihermetic compressors, semihermetic pumps, welded or brazed connections and detachable connections which are rarely detached in operation, such as weld-lip seal flanges or tongue and groove flanges.

3.1.10**part of the refrigerating system**

several components assembled together and exposed to the same pressure in operation or pressure source, respectively, as determined by the manufacturer

Note 1 to entry: The definitions and describe the most common configurations.

3.1.11**high pressure side**

part of a refrigerating system operating at approximately the condenser or gas cooler pressure

3.1.12**low pressure side**

part of a refrigerating system operating at approximately the evaporator pressure

3.1.13**mobile system**

refrigerating system which is usually in transit during operation

Note 1 to entry: Mobile systems include refrigerated cargo systems in ships, refrigerating systems in fishing boats, air conditioning on board, and transport of refrigerated cargo by road, train and containers.

3.1.14**cascade system**

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

3.1.15**transcritical system**

refrigerating system where the compressor discharges refrigerant at a pressure above the critical point

3.1.16**assembly**

several components assembled to constitute an integrated and functional whole

Note 1 to entry: Assemblies are often connected together on-site to make a complete refrigerating system.

3.1.17**component**

individual functional item of a refrigerating system

3.1.18**fixed refrigerating system**

refrigerating system that is intended to be used while fastened to a support or while secured in a specific location

3.1.19**operating state**

function that the refrigerating system is in at a specific time during normal operation

EXAMPLE standby, cooling mode, heating mode and defrosting

3.1.20**pressure equipment**

components of the refrigerating system, classified as pressure vessels according to definition , piping including its accessories (e.g. valves) according to definition [3.5](#), and safety accessories according to definition [3.6](#)

3.1.21**releasable charge limited system**

refrigerating system in which the releasable charge is limited by design measures

3.1.22

safety shut-off valve

valve for the purpose of limiting the amount of releasable charge

3.1.23

potential leak point

any point in the refrigerating system that is judged to be a weak point

Note 1 to entry: Potential leak points can include parts under stress or vibration.

3.1.24

intrinsic design method

design principle where the safety of persons or property with respect to leakage of refrigerant is ensured by measures inherent in the design and manufacture of the equipment that comprises the refrigerating system

Note 1 to entry: Limiting the charge of the system to a quantity that cannot give rise to an unsafe condition, including integral airflow in the unit to ensure that leaked refrigerant cannot stagnate and incorporating refrigerant gas detection in the controls of the indoor unit are examples of intrinsic design method.

3.1.25

extrinsic design method

design principle where limiting the charge of refrigerant in a system or part of a system is not the primary method of ensuring the safety of persons or property with respect to leakage of refrigerant from the system

Note 1 to entry: Systems constructed on site using components from several equipment manufacturers and co-ordinated by a system designer will require an extrinsic design method.

3.1.26

ducted system

refrigerating systems where air is directly ducted to the spaces and refrigerant-containing parts are within the ducted airflow

3.1.27

indirect circuit

closed circuit containing heat exchangers that are in direct contact with the substance to be treated

3.2 Occupancies, locations

3.2.1

machinery room

enclosed room or space, with mechanical ventilation, sealed from public areas and not accessible to the public, which is intended to contain components of the refrigerating system

Note 1 to entry: The room may only be entered by authorised persons.

Note 2 to entry: A machinery room can contain other equipment provided design and its installation requirements are compatible with the requirements for the safety of the refrigerating system.

3.2.2

separate refrigeration machinery room

machinery room intended to contain only components of the refrigerating system, accessible only to competent personnel for the purposes of inspection, maintenance and repair

Note 1 to entry: Where the standard refers to the term machinery room, separate refrigeration machinery rooms are included.

3.2.3**occupied space**

space in a building which is bounded by walls, floors and ceilings and which is occupied by persons for a significant period

Note 1 to entry: Where the spaces around the apparent occupied space are, by construction or design, not air tight with respect to the occupied space, these may be considered as part of the occupied space. above; e.g. false ceilings voids, crawl ways, ducts, movable partitions and doors with transfer grilles or undercut doors.

3.2.4**hallway**

corridor for the passage of people

3.2.5**exit**

opening in the outer wall, with or without a door or gate

3.2.6**exit passageway**

passageway immediately in the vicinity of the exit through which people leave the building

3.2.7**cold room**

room maintained by a refrigerating system at a temperature lower than ambient temperature

3.2.8**open air**

unenclosed space, possibly but not necessarily roofed

3.2.9**crawl space**

space that is in general accessed for maintenance only and where it is not possible to walk or access by walking

Note 1 to entry: Usually, the height of crawl spaces is less than 1 m.

3.2.10**ventilated enclosure**

enclosure containing the refrigerating system that does not enable air to flow from the enclosure to the surrounding space and has a ventilation system that produces airflow from the enclosures to the open air through a ventilation duct

3.3 Pressures**3.3.1****maximum allowable pressure**

PS

maximum pressure for which the system or component is designed for, as specified by the manufacturer

Note 1 to entry: PS is the limit which should not be exceeded whether the system is working or not.

Note 2 to entry: The Pressure Equipment Directive 2014/68/EU [\[10\]](#) designates the maximum allowable pressure as the symbol "PS".

3.4 Components of refrigerating systems**3.4.1****refrigerating installation**

assembly of components of a refrigerating system and all the apparatus necessary for its operation

3.4.2

refrigerating equipment

components forming a part of the refrigerating system

EXAMPLE compressor, condenser, generator, absorber, adsorber, receiver, evaporator, surge drum

3.4.3

compressor

device for mechanically increasing the pressure of a refrigerant vapour

3.4.4

motor-compressor

fixed combination of electrical motor and compressor in one unit

3.4.4.1

hermetic motor-compressor

combination of a compressor and electrical motor, both of which are enclosed in the same housing, with no external shaft or shaft seals

3.4.4.2

semi-hermetic motor-compressor

accessible hermetic motor-compressor

combination consisting of a compressor and electrical motor, both of which are enclosed in the same housing, having removable covers for access, but having no external shaft or shaft seals

3.4.5

open compressor

compressor having a drive shaft penetrating the refrigerant-tight housing

3.4.6

positive displacement compressor

compressor in which compression is obtained by changing the internal volume of the compression chamber

3.4.7

non-positive displacement compressor

compressor in which compression is obtained without changing the internal volume of the compression chamber

3.4.8**pressure vessel**

any refrigerant-containing component of a refrigerating system other than:

- coils (including their headers) consisting of pipes with air as secondary fluid;
- piping and its valves, joints and fittings;
- control devices;
- pressure switches, gauges, liquid indicators;
- pressure relief valves, fusible plugs, bursting discs;
- equipment comprising casings or machinery where the dimensioning, choice of material and manufacturing rules are based primarily on requirements for sufficient strength, rigidity and stability to meet the static and dynamic operational effects or other operational characteristics and for which pressure is not a significant design factor. Such equipment may include pumps and compressors.

Note 1 to entry: The semi-hermetic and open type compressors used in refrigerating systems can be subject to the exclusion Article 1.2.j of Directive 2014/68/EU [\[10\]](#) by referring to the working party group guidelines WPG 1/11, 1/12 and 2/34. The compressor manufacturer needs to decide on the basis of a case by case assessment, if the exclusion Article 1.2.j of Directive 2014/68/EU [\[10\]](#) is applicable.

Note 2 to entry: This definition is aligned to Directive 2014/68 EU [\[10\]](#).

3.4.9**condenser**

heat exchanger in which refrigerant vapour is liquefied by removal of heat

3.4.10**gas cooler**

heat exchanger in a transcritical system in which supercritical refrigerant is cooled by removal of heat

3.4.11**receiver**

vessel permanently connected to a system by inlet and outlet pipes for accumulation of liquid refrigerant

3.4.12**accumulator**

vessel capable of holding liquid refrigerant and permanently connected between the exit of the evaporator and suction of the compressor

3.4.13**evaporator**

heat exchanger in which liquid refrigerant is vaporised by absorbing heat from the substance to be cooled

3.4.14**coil or grid**

component of the refrigerating system constructed from pipes or tubes suitably connected and serving as a heat exchanger (e.g. evaporator or condenser)

3.4.15**compressor unit**

combination of one or more compressors and associated components

3.4.16**condensing unit**

combination of one or more compressors, condensers, receivers (when required) and the associated components

3.4.17

surge drum

vessel containing refrigerant at low pressure and temperature and connected by liquid feed and vapour return pipes to one or more evaporators

3.4.18

internal net volume

volume calculated from the internal dimensions of a vessel, and excluding the volume of the permanent internal parts

3.4.19

type approved component

component for which examination is performed on one or more samples of this component in accordance with a recognized standard for type approval

3.5 Piping and joints

3.5.1

piping

piping such as pipes or tubes (including hoses, bellows, fittings, or flexible pipes) for interconnecting the various components of a refrigerating system

Note 1 to entry: This definition of piping is piping covered in the scope of EN 14276-2:2020.

3.5.2

joint

connection made between two parts

3.5.3

welded joint

joint obtained by the joining of metal parts in the plastic or molten state

3.5.4

brazed joint

joint obtained by the joining of metal parts with alloys which melt at temperatures higher than 450 °C but less than the melting temperatures of the joined parts

3.5.5

flanged joint

joint made by bolting together a pair of flanged ends

3.5.6

flared joint

metal-to-metal compression joint in which a conical spread is made on the end of the tube

3.5.7

compression joint

joints which achieve tightness by deforming a compressing ring

3.5.8

taper pipe thread joint

pipe joint with tapered threads that achieves tightness with filling material or deformation of thread mount

3.5.9

header

pipe or tube component of a refrigerating system to which several other pipes or tubes are connected

3.5.10**shut-off device**

device to shut off the flow of the fluid, e.g. refrigerant, brine

3.5.11**companion valves**

pairs of mating stop valves, isolating sections of systems and arranged so that these sections may be joined before opening these valves or separated after closing them

3.5.12**isolating valves**

valves which prevent flow in either direction when closed

3.5.13**locked valve**

valve sealed or in other ways constrained, so that it can only be operated by a competent person

3.5.14**nominal size**

DN

numerical designation of size which is common to all components in a piping system other than components indicated by outside diameters or by thread size

Note 1 to entry: It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions. The nominal size is designated by DN followed by a number.

3.6 Safety accessories**3.6.1****pressure relief device**

PRD

device designed to relieve excessive pressure automatically

3.6.2**pressure relief valve**

PRV

pressure actuated valve designed to relieve excessive pressure automatically, by starting to open at a set pressure and re-closing after the pressure has fallen below the set pressure

Note 1 to entry: In some standards a pressure relief valve is called a safety valve.

3.6.3**bursting disc**

disc or foil which bursts at a predetermined differential pressure

3.6.4**fusible plug**

device containing a material which melts at a predetermined temperature and thereby relieves the fluid

3.6.5**temperature limiting device**

temperature actuated device that is designed to prevent the generation of excessive temperatures

3.6.6

switching device for limiting the pressure

pressure actuated device that is designed to stop the operation of the pressure generator

3.6.6.1

pressure limiter

switching device for limiting the pressure which automatically resets

Note 1 to entry: This pressure limiter is designated "PSH" for high pressure protection and "PSL" for low pressure protection.

3.6.6.2

type approved pressure limiter

type approved switching device for limiting the pressure with automatic reset

Note 1 to entry: It is type approved according to [\[11\]](#).

Note 2 to entry: This type approved pressure limiter is designated "PSH" for high pressure protection and "PSL" for low pressure protection.

3.6.6.3

type approved pressure cut out

type approved switching device for limiting the pressure which is reset manually without the aid of a tool

Note 1 to entry: It is type approved according to [\[11\]](#).

Note 2 to entry: If this type of approved pressure cut out is used for pressure protection it is designated "PZH" for high pressure and "PZL" for low pressure.

3.6.6.4

type approved safety pressure cut out

type approved safety switching device for limiting the pressure which is reset manually only with the aid of a tool

Note 1 to entry: It is type approved according to [\[11\]](#).

Note 2 to entry: This type of approved safety pressure cut out is designated PZHH for high pressure protection and PZLL for low pressure protection.

3.6.7

changeover valve

valve serving two safety devices and so arranged that only one can be made inoperative at any one time

3.6.8

overflow valve

pressure relief valve discharging to a part of the refrigerating system with lower pressure

3.6.9

surge protection device

device which shuts down the compressor after a few surge pulses (e.g. by measuring pressure differences across the compressor or current input to the drive motor)

3.6.10

liquid level cut out

switching device for limiting the liquid level

3.6.11

self closing valve

valve that closes automatically e.g. by weight or spring force

3.7 Fluids

3.7.1**refrigerant**

fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and a low pressure of the fluid and rejects heat at a higher temperature and a higher pressure usually involving changes of the state of the fluid

3.7.2**refrigerant type**

specific nomenclature designation of a chemical compound or blend of compounds used as a refrigerant

3.7.3**refrigerant charge**

m

amount of refrigerant, in kg, contained in a refrigerating system

3.7.4**design charge of the system**

m_d

charge of refrigerant which is planned to be contained in the system

Note 1 to entry: The design charge is marked on the system nameplate.

3.7.5**installed charge of the system**

m_i

charge of refrigerant which is put into the system when it is first set to work, and which is noted in the commissioning record

Note 1 to entry: Notification of the installed charge can be required for regulatory purposes.

3.7.6**refrigerant quantity**

m_q

amount of refrigerant, in kg, that may be present in a space but not contained in a system

3.7.7**refrigerant concentration**

m_c

refrigerant quantity divided by the volume of the space in which it is contained, in kg/m³

3.7.8**refrigerant quantity safety limit**

m_{sl}

maximum quantity of refrigerant that is allowed in a particular space

3.7.9**releasable charge**

m_{rc}

amount of refrigerant that can leak from a part of a system into a given space

Note 1 to entry: Methods to determine the releasable charge m_{rc} can be found in [Annex H](#).

Note 2 to entry: Any part of the refrigerant charge that leaks to the outdoor is excluded from the releasable charge.

3.7.10

heat-transfer fluid

fluid for the transmission of heat either without any change in its phase (e.g. brine, water, air) or with evaporating and condensing at approximately the same pressure

Note 1 to entry: When fluids listed in [\[2\]](#) are used they shall conform to all requirements for refrigerants even if they are used as a heat transfer fluid.

3.7.11

toxicity

ability of a fluid to be harmful, or lethal, or to impair a person's ability to escape due to acute or chronic exposure by contact, inhalation or ingestion

Note 1 to entry: Temporary discomfort that does not impair health is not considered to be harmful.

3.7.12

acute-toxicity exposure limit

ATEL

maximum recommended refrigerant concentration determined in accordance with this document and intended to reduce the risks of acute toxicity hazards to humans in the event of a refrigerant release

3.7.13

oxygen deprivation limit

ODL

concentration of a refrigerant or other gas that results in insufficient oxygen for normal breathing

3.7.14

flammability

ability of a refrigerant or heat-transfer fluid to propagate a flame from an ignition source

3.7.15

lower flammability limit

LFL

minimum concentration of refrigerant that is capable of propagating a flame within a homogeneous mixture of refrigerant and air

3.7.16

practical limit

concentration used for simplified calculation to determine the maximum acceptable amount of refrigerant in an occupied space

Note 1 to entry: CL is determined by toxicity and flammability tests, but practical limit is derived from CL or historically established refrigerant quantity safety limit, m_{sl} .

3.7.17

concentration limit

CL

maximum refrigerant concentration, in air, in accordance with and specified in [7.1](#) and established to reduce the risks of acute toxicity, asphyxiation, and flammability hazards

Note 1 to entry: It is used to determine the refrigerant quantity safety limit, m_{sl} for a specific space.

3.7.18

outside air

air from outside the building

3.7.19

recover

removing refrigerant in any condition from a system and storing it in an external container

3.7.20**recycle**

reducing contaminants in used refrigerants by separating oil, removing non-condensables and using devices such as filters, driers or filter-driers to reduce moisture, acidity and particulate matter

Note 1 to entry: The aim of recycling is to reuse the recovered refrigerant.

3.7.21**reclaim**

processing used refrigerants to new product specifications

Note 1 to entry: Chemical analysis of the refrigerant determines that appropriate specifications are met. The identification of contaminants and required chemical analysis both are specified in national and international standards for new product specifications.

3.7.22**disposal**

to dispose or to convey a product usually for scrapping or destruction

Note 1 to entry:

3.7.23**bubble point**

liquid saturation temperature of a refrigerant at a specified pressure at which a liquid refrigerant first begins to boil

Note 1 to entry: The bubble point of a zeotropic refrigerant blend, at constant pressure, is lower than the dew point.

3.7.24**autoignition temperature of a substance**

lowest temperature at or above which a chemical can spontaneously combust in a normal atmosphere without an external source of ignition, such as a flame or spark

3.7.25**hazard duration**

t_h

total time elapsing from the moment the refrigerant gas concentration constitutes a hazard at any location in the room until the mitigation measures triggered by the refrigerant gas detection system have been implemented

Note 1 to entry: This is approximately the length of time for which the hazard of high refrigerant gas concentration persists in the space, but it should be noted that the hazard could persist for a short period after the mitigation measures have been initiated.

3.7.26**diffusion time**

t_d

time elapsing from the moment the refrigerant gas concentration reaches the alarm trigger level at any location in the room until the concentration reaches the alarm trigger level at any of the sensor locations in the room

3.7.27**response time**

t_r

time elapsing from the moment the detector in normal operation is exposed to a defined gas concentration or a leak rate above pre-set threshold until the detector output function is activated

Note 1 to entry: The response time is defined in [\[12\]](#) for indicating detectors and measuring detectors. Either definition can be used, as appropriate, in this document.

3.7.28**mitigation time** t_m

time elapsing from the moment the refrigerant gas detection system triggers an output until the mitigation measures have been implemented

3.8 Miscellaneous**3.8.1****competence**

ability to perform satisfactorily and safely the activities related to a given task

Note 1 to entry: Levels of competence are defined in [\[13\]](#).

3.8.2**self-contained breathing apparatus**

breathing apparatus which has a portable supply of compressed air, independent of the ambient atmosphere, where exhaust air passes without recirculation

3.8.3**vacuum procedure**

procedure to remove gases and moisture from inside a refrigerating system

3.8.4**factory made**

manufactured at a dedicated production location under control of a recognised quality system

3.8.5**operator**

natural or legal person exercising actual power over the technical functioning of refrigerating systems

3.8.6**fixed refrigerant gas detector**

device which responds to a concentration of refrigerant gas in the environment

3.8.7**fixed refrigerant gas detection system**

assembly that comprises all components such as the fixed refrigerant gas detector, controllers, alarms, fans, valves, UPS etc.

4 Symbols and abbreviated terms**Table 1 — Quantities**

Symbol	Quantity	Unit	Unit symbol
A	room area	square metre	m^2
A_0	discharge area of the airflow	square metre	m^2
A_o	orifice area	square milli metre	mm^2
A_h	leak hole	square milli metre	mm^2
A_{min}	minimum room area	square metre	m^2
$ATEL$	acute toxicity exposure limit	kilogramme per cubic metre	kg/m^3