

FACT SHEET 15

Glossary of terms and technical definitions

This Fact Sheet provides definitions of terms and acronyms used. It is split into 3 sections:

- a) Terms related to fluid properties
- b) Terms related to refrigeration, air-conditioning and heat pump systems
- c) Other terms used in the Fact Sheets

Part A: Fluid properties

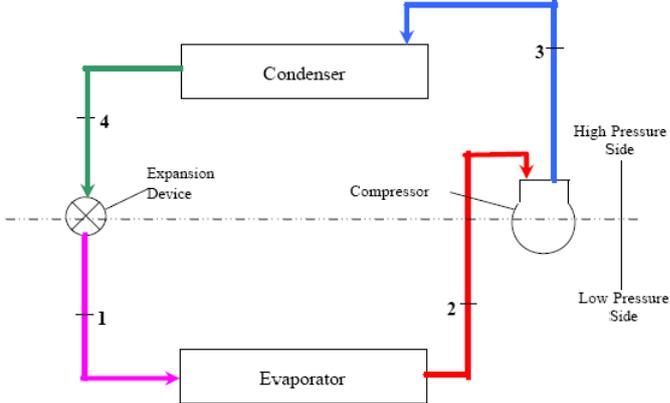
Term / Acronym	Definition
Fluorocarbons	
CFC	Chlorofluorocarbon: a family of chemicals containing chlorine, fluorine and carbon.
HCFC	Hydrochlorofluorocarbon: a family of chemicals containing hydrogen, chlorine, fluorine and carbon.
HFC	Hydrofluorocarbon: a family of chemicals containing hydrogen, fluorine and carbon.
HFO	Hydrofluoroolefin: a family of chemicals containing hydrogen, fluorine and carbon, with a double bond in the molecule.
Other fluids	
HC	Hydrocarbon: a family of chemicals containing hydrogen and carbon.
DME	Dimethyl ether: an HFC alternative used in foams and aerosols
Non-organic fluids	Non-organic chemicals e.g. ammonia (R-717) and CO ₂ (R-744)
Environmental impacts	
GWP	<p>Global Warming Potential.</p> <p>The GWP compares the global warming impact of a gas to CO₂ which is defined as having a GWP of 1.</p> <p>The GWPs of fluorocarbons are not certain and have been updated by scientists on a regular basis during the last 20 years.</p> <p>The Intergovernmental panel on Climate Change has published a number of sets of GWPs in their Assessment Reports.</p> <p>The GWP values used in these Fact Sheets are based on the 100 year AR 4 (Assessment Report 4) values.</p>
ODP	<p>Ozone Depletion Potential</p> <p>The ODP compares the impact on the ozone layer of a gas compared to CFC-11 which is defined as having an ODP of 1.</p>

ODS	<p>Ozone Depleting Substance</p> <p>A gas that can cause damage to the stratospheric ozone layer.</p>												
Safety related terms (from refrigeration safety standards)													
Flammability categories	<p>The latest refrigeration standards (e.g. ISO 5149) use 4 flammability categories:</p> <table border="0"> <tr> <td>1</td> <td>No flame propagation</td> <td>e.g. HFC-134a; R-410A</td> </tr> <tr> <td>2L</td> <td>lower flammability</td> <td>e.g. HFC-32; HFO-1234yf; R-717</td> </tr> <tr> <td>2</td> <td>flammable</td> <td>e.g. HFC-152a</td> </tr> <tr> <td>3</td> <td>higher flammability</td> <td>e.g. HC-290; HC-600a</td> </tr> </table> <p>Category 2L fluids are distinguished from Category 2 by having a low flame velocity (<10 cm/s). The 2L category has only recently been added to ISO 5149 and is not yet referred to in some older standards, although it is expected that standards such as EN 378 will soon be updated to include 2L</p> <p>Aerosol and foam markets use different flammability categories</p>	1	No flame propagation	e.g. HFC-134a; R-410A	2L	lower flammability	e.g. HFC-32; HFO-1234yf; R-717	2	flammable	e.g. HFC-152a	3	higher flammability	e.g. HC-290; HC-600a
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Toxicity classes	<p>Refrigeration safety standards use 2 toxicity classes:</p> <table border="0"> <tr> <td>A</td> <td>lower toxicity</td> <td>e.g. HFC-134a; HC-290</td> </tr> <tr> <td>B</td> <td>higher toxicity</td> <td>e.g. R-717 (ammonia)</td> </tr> </table>	A	lower toxicity	e.g. HFC-134a; HC-290	B	higher toxicity	e.g. R-717 (ammonia)						
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Location classes	<p>Refrigeration safety standards use 3 location classes:</p> <p>Class A, General occupancy: A location where people may sleep or where the number of people present is not controlled or to which any person has access without being personally acquainted with the personal safety precautions.</p> <p>Class B, Supervised occupancy: Rooms, parts of buildings or buildings, where only a limited number of people may be assembled, some of them being necessarily acquainted with the general safety precautions.</p> <p>Class C, Authorised occupancy: An occupancy which is not open to the public and where only authorised persons are granted access. Authorised persons shall be acquainted with general safety precautions of the establishment (e.g. industrial production facilities).</p>												
Azeotropic and non-azeotropic refrigerant blends	<p>An azeotropic blend behaves as a pure fluid when it evaporates. Non-azeotropic blends evaporate at a changing temperature referred to as a temperature glide.</p>												

Part B: Terms related to refrigeration, air-conditioning and heat pumps

Term / Acronym	Definition
Absorption	A heat driven refrigeration cycle involving the absorption of a refrigerant vapour into a liquid.
Adsorption	A heat driven refrigeration cycle involving the adsorption of a refrigerant vapour into a solid.
Cascade	A type of refrigeration cycle used for very low temperature applications, using two separate circuits, each with a different refrigerant.
Chiller	A refrigeration system designed to chill a liquid
Condensing unit	A combination of a condenser and compressor. Used in split systems connected to an evaporator in a separate location.
COP	Coefficient of Performance – a measure of refrigeration cycle efficiency. For refrigeration systems the COP is the cooling by the evaporator divided by energy input For heat pumps the COP is the heat output from the condenser divided by energy input
Critical temperature	The critical temperature is a property of a refrigerant fluid. Above the critical temperature there is no distinction between liquid and vapour phases. Most refrigerants operate below the critical temperature, with change of phase from liquid to vapour an important aspect of the system design. R-744 (CO ₂) has a very low critical temperature (31°C) and when used in a vapour compression refrigeration cycle may need to reject heat at a temperature above the critical temperature.
DX evaporator	Direct expansion. A type of evaporator design where all the liquid refrigerant is fully evaporated. Most medium and large DX systems use thermostatic or electronic expansion valves. Very small DX systems use capillary tube expansion. DX systems are usually the lowest cost option for small systems but they may be less efficient than flooded systems.
Flooded evaporator	A flooded system uses a type of evaporator where not all the liquid supplied is evaporated. Flooded systems usually use either a pumped or a gravity circulation system. Flooded systems use level controlled expansion valves. They provide a fully wetted evaporator surface, which maximises efficiency.
Hermetically sealed	A factory built refrigeration system with all brazed or welded joints. Usually this refers to domestic refrigerators or small stand-alone commercial systems.
Indoor unit	The evaporator for a split or multi-split air-conditioning unit.

LT	Low Temperature. A widely used term in the food retail sector referring to frozen products, usually in the -18°C to -25°C range.
MAC	Mobile air-conditioning. This refers to any air-conditioning system used in a vehicle including MACs in cars, buses and trains.
MT	Medium Temperature. A widely used term in the food retail sector referring to chilled products, usually in the +2°C to +6°C range.
Multi-split system	A split system air-conditioning unit consisting of one outdoor unit and several indoor units.
Outdoor unit	The condenser and compressor (condensing unit) of a split air-conditioning system.
Primary refrigerant	A primary refrigerant is the fluid used in a vapour compression refrigerant cycle. Cold liquid primary refrigerant is evaporated to provide cooling – the resulting vapour is then compressed and condensed.
RACHP	Refrigeration, air-conditioning and heat pumps
Reversible air-conditioning system	A type of air-conditioning system that can provide either cooling or can be reversed to operate as an air-source heat pump.
Secondary refrigerant	A secondary refrigerant is used to transfer cooling from a primary refrigerant to a cooling demand. The secondary refrigerant is cooled by a primary refrigerant in a vapour compression chiller. Most secondary refrigerants are liquids such as chilled water (for temperatures above 0°C) or an anti-freeze solution such as glycol or brine (for temperatures below 0°C). Other types of secondary refrigerant include water / ice mixtures (the ice melts as it provides cooling) and volatile fluids such as CO ₂ (the fluid evaporates as it provides cooling).
Sorption	A term used to refer to heat driven refrigeration cycles including absorption and adsorption systems.
Split system	A type of refrigeration or air-conditioning system with a cooling evaporator in one location and a compressor / condenser in a different location. Usually used with reference to small air-conditioning systems that use an indoor unit and an outdoor unit.
Stand-alone	Small factory built refrigeration units that simply need to be connected to an electricity supply. A domestic refrigerator is a stand-alone system. Various types of stand-alone unit are used in food retail and food service.
Sub-critical	A refrigeration system with both the evaporator and the condenser operating at a temperature below the critical temperature. Most refrigeration systems operate in this way.
Transcritical	A refrigeration system where the evaporator operates below the critical temperature, but the condenser operates as a gas cooler at above the critical temperature. CO ₂ systems operate in transcritical mode when the ambient temperature is above around 20°C. They can operate in sub-critical mode at lower ambient temperatures.

<p>Vapour compression cycle</p>	<p>Most refrigeration systems operate with a vapour compression cycle. The simplest designs consist of 4 main components as shown in the diagram. Low temperature liquid (at low pressure) is fed to an evaporator. It provides cooling as liquid is boiled to vapour. The vapour is compressed and is then able to reject heat in a condenser as it turns from vapour to liquid. The high pressure liquid passes through an expansion device where the pressure and temperature fall (as a proportion of the liquid flashes off into vapour). The cycle is then repeated.</p>  <p>The diagram illustrates a vapour compression cycle. It consists of four main components connected in a loop: a Condenser at the top, an Expansion Device on the left, a Compressor at the bottom right, and an Evaporator at the bottom. The cycle is divided into a High Pressure Side (top and right) and a Low Pressure Side (bottom and left) by a horizontal dashed line. The refrigerant flows clockwise. Point 1 is at the evaporator inlet, point 2 is at the evaporator outlet, point 3 is at the condenser inlet, and point 4 is at the condenser outlet. The expansion device is shown as a circle with an 'X' inside.</p>
<p>VRF</p>	<p>Variable refrigerant flow: a type of split system air-conditioning system used in medium and large sized air-to-air applications. One or more condensing units are connected to a number of indoor units (up to 64). Each indoor unit can be selected for either cooling or heating. Variable speed compressors provide control flexibility.</p>
<p>VRV</p>	<p>Variable refrigerant volume: a variant of VRF system.</p>

Part C: Other terms used in the Fact Sheets

Term / Acronym	Definition
ATP	The ATP is a UN treaty that sets standards for the performance of temperature controlled vehicles. It applies in more than 50 countries and sets performance standards for vehicle bodywork and refrigeration units.
DPI	Dry Powder Inhaler. Used as an alternative to MDIs to deliver respiratory drugs.
EPA	US Environmental Protection Agency
MDI	Metered Dose Inhaler. A specialised aerosol used to deliver respiratory drugs. MDIs use HFC aerosol propellants.
NIK	Not-in-kind. Used to refer to alternative technologies that can replace HFC applications.
OCF	One Component Foam. A type of aerosol used in the building industry to create a polyurethane foam seal e.g. around window frames and door frames, to ensure an air-tight fit. Some OCF canisters use HFC aerosol propellants.
PF foam	Phenolic insulation foam.
PIR foam	Polyisocyanurate insulation foam.
PU foam	Polyurethane insulation foam
PU-type foam	A collective term for PU, PIR and PF foams
RTOC	Refrigeration Technical Options Committee of the Montreal Protocol Technical and Economic Assessment Panel
SNAP	Significant New Alternatives Programme. A US EPA process that specifies acceptable uses of HFCs and other gases such as HCs.
XPS foam	Extruded polystyrene insulation foam