

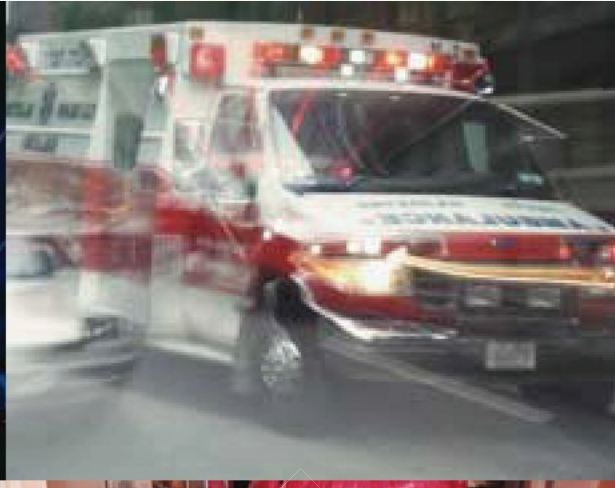

HVAC/R Terminology

A Quick Reference Guide

2nd Edition


Richard Wirtz

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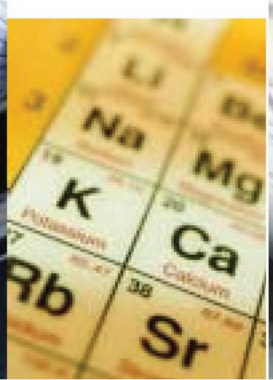

HVAC/R

TERMINOLOGY

A Quick Reference Guide

BY

RICHARD WIRTZ

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This book is dedicated to the wonderful and dedicated people of the Heating, Air Conditioning, Refrigeration

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It is not possible to write a document of this size and magnitude without the helpful assistance of other people and organizations. As with any book of this type, it is a team effort. They helped me gather vital information that is critical to the successful completion of this book.

Disclaimer:

This book is meant as an industry reference guide. Terms contained within may deviate from standard dictionary definitions as they are meant to be applicable within the scope of the HVACR industry.

Table of Contents

-A-

A - symbol used for the measurement of current flow (amperage).

Abs - acrylonitrilebutadiene styrene.

Ac - alternating current.

Acb - air circuit breaker.

Acu - air conditioning unit.

Acfm - the actual volumetric flow rate of air-vapor mixture. Unit is cubic feet per minute.

Ach - air changes per hour.

ACR - air conditioning and refrigeration.

ADC - analog to digital converter.

ADP - apparatus dew point.

Aec - annual energy cost.

AEV - automatic expansion valve.

AFCI - arc fault circuit interrupter

AFUE - annual fuel utilization efficiency.

Ag - silver.

Ahp - air horsepower.

AHU - air handling unit.

AIF - Acoustic Insulation Factor.

Ail - amber indicator light.

Al - aluminum.

ALU - arithmetic logic unit.

Am - ammeter.

Amb - ambient.

Amp - ampere.

Ann - annunciator.

Arm - armature.

As - ammeter switch.

ASCII Code - American Standard Code for Information Interchange.

ATC - automatic temperature compensation.

Atm - atmosphere.

Auto - automatic.

Aux - auxiliary.

AWG - American Wire Gauge.

AXV - automatic expansion valve.

"A" cock - a manual gas valve placed in the main gas line to shut off flow of gas to the piece of equipment. A "B" cock fitting is tapped into the side of the "A" cock for the pilot gas shut off valve. The "a" cock valve shall be installed so that the "B" cock fitting is on the upstream side of the gas flow.

A-coil - component on the low pressure side of the refrigeration system where liquid evaporates and absorbs heat into the evaporator. So called because the physical shape of the coil resembles the letter "A".

A-weighted - a term referring to the single number logarithmic summation of the 8 octave bands that have been adjusted to account for response of human ear to sound pressure level.

Abort - premature termination of a program during execution.

Abrasion - a scrape or other damage on an object's surface. A general wearing away of a surface by constant scratching, usually due to the presence of foreign matter such as grit, or metallic particles in a lubricant. It may also cause a break down of a material such as the tooth surfaces of gears. Lack of proper lubrication may result in abrasion.

Abrasion resistance - the ability of a material or cable to resist surface wear.

ABS pipe - acrylonitrilebutadiene styrene plastic pipe that is used for water, drains, waste, and venting (DWV).

Absolute - a chemical substance relatively free of impurities.

Absolute filtration rating - the diameter of the largest hard spherical particle that will pass through a filter under specific test conditions. This is an indication of the largest opening in the filter elements.

Absolute humidity - the total amount of moisture that is present in one cubic foot of air, as indicated by grains of moisture per cubic foot.

Absolute pressure - pressure measured from a perfect vacuum as a base. The common gauge expresses a pressure in pounds per square inch called gauge pressure. When the gauge is open to the atmosphere, it reads zero. The sum of gauge pressure (psig) plus atmospheric pressure (14.696 lb per square inch). Atmospheric pressure is 14.7 psi at sea level. It varies with location and atmospheric conditions. It is accurately indicated by a barometer. Absolute pressure can only be zero in a perfect vacuum.

Absolute temperature - the measurement of temperature from absolute zero (-459.7º F). The temperature as read on the Fahrenheit scale plus 460 degrees.

Absolute viscosity - a term used interchangeably with viscosity to distinguish it from either kinematic viscosity or commercial viscosity. Absolute viscosity is the ratio of shear stress to shear rate. It is a fluid's internal resistance to flow. The common unit of absolute viscosity is the poise. Absolute viscosity divided by fluid density equals kinematic viscosity. It is occasionally referred to as dynamic viscosity. Absolute viscosity and kinematic viscosity are expressed in fundamental units. Commercial viscosity such as Saybolt viscosity is expressed in arbitrary units of time, usually seconds.

Absolute zero - the temperature at which molecular motion theoretically stops. This temperature is considered to be -459.7º F and -273º C. At absolute zero there is considered to be a complete absence of heat.

Absorb - to soak up. The incorporation of a liquid into a solid substance, as by capillary, osmotic, solvent, or chemical action.

Absorbent - substance that has the ability to pick up, take up, or hold some other substance. One example would be the salt solution used to attract water in an absorption water chiller.

Absorbent filter - a filter medium that holds contaminant by mechanical means.

Absorber - the component, in an absorption cycle, where the heat laden refrigerant vapor is re-absorbed into the solution.

Absorber plate - the section of the solar collector responsible for gathering the solar radiation from the sun.

Absorber shell - the lower shell of a lithium bromide absorption chiller, containing the absorber and the evaporator, where water vapor is absorbed by the lithium bromide solution in the absorption cycle.

Absorber, sound - a device, panel, or material specially designed to absorb sound energy. Such devices are usually constructed of porous materials composed of organic or mineral fibers.

Absorption - (1) a process whereby a material extracts one or more substances present in an atmosphere or mixtures of gases or liquids. Accompanied by physical change, chemical change, or both, of the material. (2) a type of chiller machine that relies on heat energy to cool a liquid, such as water, and then uses the cooled liquid to cool something else.

Absorption coefficient - the absorption coefficient of a material or sound absorbing device is the ratio of the sound absorbed to the sound incident on the material or device. The sound absorbed by a material or device is usually taken as the sound energy incident on the surface minus the sound energy reflected.

Absorption refrigerator - a system in which the refrigerant, as it is absorbed in another liquid, maintains the pressure difference needed for successful operation of the system.

Absorption, solar - the ability of a solar collector to soak up light and therefore capture the heat of the sun. Absorption (or absorptance) is measured as a percentage of the total radiation available.

Absorption system - one of the most common types of cooling systems associated with solar radiation.

Absorptivity - the ratio of radiant energy absorbed by an actual surface at a given temperature to that absorbed by a black body at the same temperature.

AC electrolytic capacitor - this capacitor can house a large amount of capacitance in a small case size, is designed for short term use only, and used as the starting capacitor on single phase motors.

Accelerate - to add to the speed or velocity; or to hasten progress of development.

Accelerated aging - a test performed on materials that simulate or duplicate long time environmental conditions in a relatively short period of time.

Accelerated depreciation - the declining balance and sum of the years' digits methods which allocate a greater portion of depreciation to the early years of the life of the asset.

Acceleration time - when a motor is used to accelerate a rotating load, acceleration time is the response time of the motor to bring the load from zero to normal running speed.

Accelerator - a chemical additive that hastens a chemical reaction under specific conditions.

Acceptable air quality - air in which there is no known contaminants at harmful concentrations and with which a substantial majority (usually 80%) of the people exposed do not express dissatisfaction.

Acceptable thermal environment - an environment which at least 80% of the occupants would find thermally acceptable.

Acceptor - a dopant material such as boron that has fewer outer shell electrons than required in an otherwise balanced crystal structure, providing a hole that can accept a free electron.

Acceptor ion - an atom in a doped semiconductor that accepts an electron or gives up a hole.

Access - that which enables a device, appliance or equipment to be reached by ready access or by means that first requires the removal or movement of a panel, door or similar obstruction.

Access door - a door, cover or lid that can be moved or opened for inspection or servicing of internal components.

Access fitting - a valve or fitting that provides or creates an opening into a closed system.

Access time - the time it takes a computer to produce a bit of information from its memory section, also called "read time", or the time it takes a computer to store information in its memory section. Also called "write time."

Access to - that which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, door or similar obstruction.

Accessible - easily approached, removed or exposed. Not permanently concealed.

Accessible, equipment – admitting close approach: not guarded by locked doors, elevation, or other effective means.

Accessible hermetic - the assembly of the motor and compressor inside a single bolted housing. Also referred to as a semi-hermetic compressor.

Accessible, readily - having direct access without the need of removing any panel, door, or similar covering of the item described.

Accessible, wiring methods - capable of being removed or exposed without damaging the building structure or finish, or not permanently closed by the structure or finish of the building.

Accessories - those items that add to the effectiveness or convenience of a system, but are not essential to its operation.

Accumulation test - test used to establish the relieving capacity of boiler safety valves.

Accumulator, electronic - the register within a computer where the results of all arithmetic and logical operations are placed.

Accumulator, refrigeration - a storage tank that receives any liquid refrigerant from the evaporator and prevents it from flowing into the suction line. It allows small amounts of liquid refrigerant to boil away before entering the compressor. Sometimes used to store excess refrigerant in heat pump systems during the winter cycle.

Accuracy - the precision of a reading in relation to the actual measurement. The extent to which the measured value of a quantity agrees with the accepted, consensus, or true value of that quantity. The accuracy of a measurement is its "closeness" to a defined true or reference value. For example, a measurement that is uncertain by ±1% is 99% accurate.

Acetone - a liquid solvent used in acetylene storage tanks.

Acetylene - fuel gas used for soldering, brazing, or cutting. Molecular weight is 26.038 and specific volume is 14.7 cubic feet/lb. Chemical formula is C_2H_2. Flammability limits are 2.75 to 100% by volume.

Acfm - the actual volumetric flow rate of air vapor mixture. Units are cubic feet per minute.

Acid - either an inorganic or organic compound (1) that reacts with metals to yield hydrogen; (2) that reacts with a base to form a salt; (3) that dissociates in water to yield hydrogen or hydronium ions; (4) that has a pH of less than 7.0; (5) that neutralizes bases or alkaline media. All acids contain hydrogen and turn litmus paper red. They are corrosive to human tissue and are to be handled with care.

Acid aerosol - acidic liquid or solid particles that are small enough to become airborne. High concentrations of acid aerosols can be irritating to the lungs and have been associated with some respiratory diseases, such as asthma.

Acid condition - the condition in which refrigerant or oil in the system are mixed with acidic fluids.

Acid test - a test that provides a positive indication whether the concentration of acid level in the oil being tested is either safe or unsafe.

Acid test ratio - a calculation of a firm's liquidity position; that is, the ratio of its quick assets (those that can be easily converted to cash) to current liabilities.

Acidity - water is a chemical combination of hydrogen (H) and oxygen (O) that is represented by the formula H_2O. It may also be treated as a chemical combination of hydrogen ions (H) and hydroxyl ions (OH). If there is a greater number of hydrogen ions than hydroxyl ions as a result of the chemical action of impurities or solutes, the solution is

acid. A greater number of hydroxyl ions results in an alkaline solution. The degree of acidity or alkalinity of a substance is known as the hydrogen-ion concentration and is called the pH value. A pH value of 7.0 indicates neutral water; a value less than 7.0, acidity; and a value greater than 7.0, alkalinity.

Acme lock - a sheet metal lock made by turning the edges of adjoining sheets 180 degrees in opposite directions, hooking them together and locking them tight with a grooving tool.

Acoustical - pertaining to sound.

Acoustical duct lining - ducts with a lining designed to control or absorb sound and prevent transmission of sound from one room to another.

Acoustical treatment - the application or use of any sound absorbers, building materials, or structures and construction techniques for the purposes of controlling noise and improving the acoustical environmental.

ACR tubing - an air conditioning/refrigeration grade tubing. This tubing is a type "L" copper that is very clean, dry and has both ends sealed to prevent contaminants from entering.

Acrolein - a warning agent often used with methyl chloride to call attention to the escape of refrigerant. The material has a compelling, pungent odor, and causes irritation of the throat and eyes. Acrolein reacts with sulfur dioxide to form a sludge.

Across the line - a method of motor starting that connects the motor directly to the supply line on starting or running. Also known as full voltage starting.

Acrylonitrile butadiene styrene (ABS) - material used to made plastic pipe and fittings used for drain, waste, and vent piping.

Activated alumina - a chemical in the form of aluminum oxide (Al_2O_3) that is found as a desiccant in filter driers. Operates by adsorption of water molecules.

Activated carbon - a specially processed carbon that is used in filter driers or used to filter and/or clean air.

Activated charcoal - material at is either powered, granular, or pelleted carbon, coal or coconut shells that are capable of absorbing odors, gases, and vapors because of their fine pores.

Activator - a chemical additive used to initiate the chemical reaction in a specific chemical mixture.

Active region - an area of transistor operation between cut-off and saturation.

Active recovery - a self contained (independent) method of recovering refrigerant from mechanical refrigeration systems in which the gauge manifold is connected to the suction and the discharge service valves. Refrigerant is removed from the system by a recovery unit and stored in a recovery cylinder.

Active solar system - solar system that use the forced movement of a fluid to transfer heat from the collector to the heated space. Systems that use electrical and/or mechanical devices to help collect, store, and distribute the sun's energy.

Actual air delivery in SCFM - The standard cubic feet per minute of compressed air actually delivered at the air compressor's discharge port.

Actual body rating - see valve body rating.

Actual evaporation - the total quantity of water evaporated from any temperature feed water (in pounds) to steam at the working pressure and temperature.

Actual torque - the actual torque required to drive a machine. It is the torque measured at the input shaft of a machine being driven.

Actuator - a controlled motor, relay or solenoid in which the electrical energy is converted into a rotary, linear, or switching action. An actuator can effect a change in the controlled variable by operating the final control elements a number of times. Valves and dampers are examples of mechanisms that can be controlled by actuators. Also see proportional, spring return, and two-position actuators.

Acute angle - an angle less than 90 degrees.

Adapted person - a person who has occupied a space for more than 15 seconds. According to ASHRAE, such a person is considered to be at least partially adapted to odors in the space. The 15 second definition for adaptation does not imply that all persons will accept the surroundings in this time frame.

Adapter - special fittings used to quickly and easily connect different parts for different applications.

ADC - an analog to digital converter. An electronic device that converts analog signals to an equivalent digital form, in either a binary code or a binary-coded decimal code. When used for dynamic waveforms, the sampling rate must be high to prevent aliasing errors from occurring.

Add-a-relay - relays that are especially designed to satisfy the remote mounting requirements of bypassing a furnace for control when adding air conditioning.

Addendum - the radial distance from the pitch circle to the top of the gear tooth.

Addendum - modification or change made to the construction documents (plans or specifications) during the building process.

Additive - a compound that enhances some property of, or imparts some new property to, the base fluid. In some hydraulic fluid formulations, the additive volume may constitute as much as 20% of the final composition. The more important types of additives include anti-oxidants, anti-wear additives, corrosion inhibitors, viscosity index improvers, foam suppressants and fuel stabilizers.

Add-on heat pump - a special application of a heat pump where the unit is installed to work in conjunction with an existing gas, oil, or electric furnace.

Address - numeric code that precedes a controller's command to the controlled device. The controlled device will respond only to commands preceded by its assigned address code number.

Address bus - a unidirectional bus over which digital information appears to identify either a particular memory location or a particular I/O device.

Address selector - switches on the controlled device that are used to assign it to an address code number.

Adhesion - the property of a lubricant that causes it to cling or adhere to a solid surface.

Adhesion filter - this type of filter is used by most window air conditioners. It removes up to 90% of the dirt until it gets loaded. Adhesive filters can be of the permanent or throw-away type.

Adhesive - a substance capable of holding materials together by surface attachment.

Adhesive failure - rupture of an adhesive bond, such that the plane of separation appears to be at the adhesive-adhered interface.

Adhesive solvent - an adhesive having a volatile organic liquid as a vehicle. Also see solvent cement.

Adhesive wear - is often referred to as galling, scuffing, scoring, or seizing. It happens when sliding surfaces contact one another, causing fragments to be pulled from one surface and to adhere to the other.

Adiabatic - describes a system or thermodynamic process in which virtually no gain or loss of heat is allowed to occur with (to or from) the surroundings.

Adiabatic compression - the ability to compress a gas without removing or adding heat.

Adiabatic expansion - when steam is expanded in such a manner that there is no heat flow into or away from the steam and all the heat energy lost by the steam is converted into work, the process is called "adiabatic expansion." Steam expanding behind the piston of a steam engine after the point of cut-off approaches adiabatic expansion.

Adiabatic process - a process in which there is neither a loss nor gain in the total heat content. A constant enthalpy process.

Adiabatic saturation - theoretical achievement of 100% moisture saturation of air without gaining or losing heat energy.

Adjacent conductor - any conductor next to another conductor either in the same multi-conductor cable layer or in adjacent layers.

Adjustable - to bring to a more satisfactory state or to regulate.

Adjustable auto-transformer - a transformer in which parts of one winding are common to both the primary and the secondary circuits. The output voltage is adjustable from zero to line voltage.

Adjustable differential - a means of changing the difference between the control cut-in and cut-out points.

Adjustable wrench - an adjustable open end wrench has a sliding jaw that moves by an adjusting screw. This wrench should not be used in place of an open end wrench. It is used when an odd size nut or bolt needs to be worked on.

Adjusted dry bulb temperature - the average of the air temperature and the mean radiant temperature at a given location. The adjusted dry bulb temperature is approximately equivalent to operative temperature at air motions less than 0.4 m/s (80fpm) when the mean radiant temperature is less than 50º C (120º F).

Adjusting entries - entries required to adjust the accounts to their correct balances at the end of an accounting period.

Adjustment - the procedure required to produce the exact setting, response or effect desired.

Adjustment factor - a multiplier or penalty that is applied to conductors when there are more than three current carrying conductors in a raceway or cable. An adjustment factor is also referred to as a derating factor.

Administrative controls - a number of measures used to reduce worker exposure, including work practices, labeling and warning devices, training, environmental monitoring, assignment scheduling, housekeeping, maintenance, and management.