Description of Useful HVAC Terms

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A. Bhatia

Continuing Education and Development, Inc.

P: (877) 322-5800
info@cedengineering.com

HVAC TERMINOLOGY

Terms	Description
Abatement:	Reduction or removal of a contaminant.
Absolute Humidity:	The mass of water vapor in a given volume of air. Measured in Grains per cubic foot or may also be measured as the partial pressure of the water vapor.
Absolute Pressure:	Gauge pressure plus atmospheric pressure (14.7 PSI) equals absolute pressure. Pressure is sometimes measured not as an absolute pressure, but as the excess of that pressure above atmospheric pressure, sometimes called gauge pressure. An example of this is the air pressure in a tire of a car, which might be said to be "thirty PSI", but is actually thirty PSI above atmospheric pressure. In technical work, this would be written as "30 PSIG" or, more commonly, "30 psig".
Absolute Temperature:	Temperature measured from absolute zero. A temperature scale expressed in degrees F or C using absolute zero as a base. Referred to as the Rankin or Kelvin scale.
Absolute Zero Temperature:	The temperature at which molecular activity theoretically ceases. (-460°F and -273°C)
Absorbent:	Substance with the ability to take up or absorb another substance.
Absorption:	The penetration of one substance into the inner structure of another substance, as distinguished from adsorption in which one substance is attracted to and held on the surface of another substance.
Absorption Refrigerator:	A refrigerator that uses a heat source to provide the energy needed to drive the cooling system. Absorption refrigerators are a popular alternative to regular compressor refrigerators where surplus heat is available (e.g. combined heat and power (CHP) or industrial processes). <u>Absorption v/s vapor compressor refrigerators:</u> In both absorption and vapor compressor refrigerators when the refrigerant evaporates and boils, it takes some heat away with it, providing the cooling effect. The main difference between the two types is the way the refrigerant is changed from a gas back into a liquid so that the cycle can repeat A compressor refrigerator uses an electrically-powered compressor to increase the pressure on the gas, and then condenses the hot high pressure gas back to a liquid by heat exchange with a coolant (usually air). Once the high pressure gas has cooled, it passes through a pressure release valve which drops the refrigerant temperature to below freezing. An absorption refrigerator changes the gas back into a liquid using a method that needs only heat, and has no moving parts. Compressor refrigerators typically use an HCFC, while absorption refrigerators typically use ammonia.
ACCA:	Air conditioning Contractors of America: a leading HVAC/R Association, http://www.acca.org/
Acceptable Indoor Air Quality:	1) Indoor air that does not contain harmful concentrations of contaminants; 2) Air with which at least 80% of building occupants do not express dissatisfaction.
Access floor:	A platform structure typically consisting of 0.6 m x 0.6 m (2 ft x 2 ft) concrete-filled steel floor panels supported on pedestals 0.2 to 0.46 m (8" to 18") above the concrete structural floor slab. Each panel can be independently removed for easy access to the under floor plenum created below and can include openings for electrical outlets, grilles or any other floor accessory in its thickness. In most office installations, carpet tiles are laid on top to provide a finished floor surface. Raised floor systems provide maximum flexibility and significantly lower costs associated with reconfiguring building services.
Accessible Hermetic:	Assembly of a motor and compressor inside a single housing unit.

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Accumulator:	Storage tank which receives liquid refrigerant from evaporator and prevents it from flowing into suction line before vaporizing. Tank on the suction side of a system that holds excess refrigerant to prevent slugging the compressor with liquid.
ACGIH:	American Conference of Governmental Industrial Hygienists.
ACH:	Air Changes per Hour. The number of times that air in a space is completely replaced with outdoor air in one hour.
Acid Aerosol:	Airborne acidic liquid or solid particles. High concentrations can be irritating to the lungs. They have been associated with some respiratory diseases, such as asthma.
Acid Condition in System:	Condition in which refrigerant or oil in the system is mixed with fluids that are acidic in nature.
Acid Rain:	Acid rain is an environmental phenomenon, when rain becomes acidic due to the emission of sulfur dioxide and nitrogen oxides. To learn more, refer to the U.S. Environmental Protection Agency's Acid Rain Home Page.
ACR Tubing:	Tubing used in air conditioning and refrigeration. Ends are sealed to keep tubing clean and dry.
Action Level:	A term used to identify the level of indoor radon at which remedial action is recommended.
Action Packet:	In reference to the indoor air quality "Tools for Schools Kit". The packet contains three components (an introductory memo, IAQ Backgrounder, and IAQ Checklist) to assist school personnel to implement an effective yet simple indoor air quality program in their school.
Activated Alumina:	Chemical that is a form of aluminum oxide. It is used as a drier or desiccant.
Activated Carbon:	Specially processed carbon used as a filter drier; commonly used to clean air from volatile organic compounds (VOC's).
Active Diffuser:	Any air supply outlet that relies on a local fan to deliver air from the plenum through the diffuser into the conditioned space of the building.
Actuator:	That portion of a regulating valve which converts mechanical fluid, thermal energy or electrical energy into mechanical motion (for e.g. to open or close the valve seats).
Actuator Motor:	An electric motor that is used to open/close valves, and open/close dampers or other control function. Pneumatic actuators can do the same function but are air operated instead of using electric power.
Adapt-A-Curb:	A curb adapter, which will allow for a different size of rooftop unit to replace an older one without roofing changes. If allowed by the owner of the building usually there is no additional roofing work needed. *(See also Curb).*
Add On Heat Pump:	Installing a heat pump in conjunction with an existing fossil fuel furnace. The result is a dual fuel system.
Addendums:	Addendums are issued as changes, amendments, or clarifications to the original or previously issued Contract Documents.
Adiabatic:	A thermodynamic process during which energy (heat) is neither added to nor removed from the system. Natural evaporation/condensation is an adiabatic process in which a liquid can change phase to a vapor and back to a liquid without the total energy of the system being changed from outside the system.
Adiabatic Compression:	Compressing refrigerant gas without removing or adding heat.
Adjustable Grille:	A grille with linear blades which can be adjusted to vary the direction of the discharged air. The linear blades are normally either vertical or horizontal, or both horizontal and vertical.
Adjusting:	The term "adjusting" may be described as the final setting of balancing devices such as dampers and valves, in addition to automatic control devices, such as thermostats and pressure/temperature controllers to achieve maximum system performance and efficiency during normal operation. Adjusting also includes final adjustments for pumps by

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	regulation of motor speed, partial close-down of pump discharge valve or impeller trim (preferred over the partial close-down of pump discharge valve).
Adsorbent:	Substance with the property to hold molecules of fluids without causing a chemical or physical damage. Also called desiccant.
Adsorption:	Adherence of molecules of a gas (vapor) to the surface of another substance called the adsorbent (desiccant). Activated carbon, activated alumina, silica gel, and molecular sieves are examples of adsorbents. Adsorbents do not change phase due to the adsorption process.
Aeration:	Act of combining substance with air.
Aerosol:	A suspension of liquid or solid particles in air.
AFUE):	Annual Fuel Utilization Efficiency is a rating that shows how much heat you get for every dollar you spend for energy. It's determined by dividing the total energy used into the total heating produced. The AFUE number compares the percentage of heat delivered to the amount lost up the chimney, based on each unit of fuel. A higher rating indicates more efficient equipment. This rating is calculated in accordance with the Department of Energy test procedures. This value is intended to represent the ratio of heat transferred to the conditioned space by the fuel energy supplied over one year. The U.S. Government's minimum efficiency level is 78%.
AGA:	American Gas Association
Agitator:	Device used to cause motion in confined fluid.
AHU :	Air Handling Unit
Air Change Effectiveness (ACE):	Air change effectiveness describes the ability of an air distribution system to provide ventilation (outside) air at the breathing zone (where occupants breathe). ACE is defined as the age of air that would occur throughout the space if the air was perfectly mixed, divided by the average age of air where occupants breathe.
Air Change:	The amount of air required to completely replace the air in a room or building. Expressed in one of two ways: the number of changes of outside air per unit of time in air changes per hour (ACH); or the rate at which a volume of outside air enters per unit of time - cubic feet per minute (CFM). The amount of air in CFM can be calculated by multiplying the volume of room in cu-ft by the number of air changes required and dividing by 60. For a 1000 cu-ft room volume, the air change rate at 3 air changes is: 1000 * 3/60 = 50 CFM. For hazardous locations, the codes sometimes provide a minimum air change rate of 12. For comfort air-conditioning, air change rate of 0.5 to 2 ACH is satisfactory. For clean room applications the air change rate is usually very high; more than 30 depending on the level of cleanliness.
Air Changes per Hour (ACH):	A measure of the air exchange rate of a building, or space, that gives the time unit in hours.
Air Cleaner:	Device used for removal of airborne impurities. A device that actively removes impurities from the air, including forced air filtration systems and electronic air cleaners. Air cleaners may be added to HVAC systems or stand-alone room units.
Air Cleaning:	An indoor air quality control strategy to remove various airborne particulates and/or gases from the air. The three types of air cleaning most commonly used are particulate filtration, electrostatic precipitation, and gas sorption.
Air Coil:	A type of heat exchanger typically fabricated of rows of copper tubes bonded with aluminum fins. The air coil is used both as an evaporator or condenser.
Air Conditioner:	Device used to control temperature, humidity, cleanliness and movement of air in a confined space.

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Air Conditioning:	The process of controlling the temperature, humidity, cleanliness and distribution of the air in a confined space. Commonly when we think of air conditioning we mean cooling. Cooling means to reduce temperature and air conditioning means more than cooling. The phrase "air conditioning" when used to mean conditioning of air has a far greater scope. Conditioning of air in an environment to provide comfort or process will do some or all of the following: 1. Heating:- Comfort, storage, and process 2. Cooling:- Comfort, storage, and process 3. Cleaning:- Microbial filters in pharmaceutical plants, clean rooms, and hospitals 4. Humidifying:- Comfort, manufacturing, and storage 5. Dehumidifying:- Comfort, manufacturing, and storage 6. Exchanging air: - Providing a percentage of outside (fresh) air for odor dilution, oxygen depletion, and positive pressure. Outside Air or Fresh Air is also a code requirement for commercial buildings. Indoor Air Quality (IAQ) is associated with exchanging air.
Air Cooled Condenser:	Uses a fan to discharge heat from the condenser coil to the outdoors.
Air Cooler:	Mechanism designed to lower temperature of air passing through it.
Air Core Solenoid:	Solenoid that has a hollow core instead of a solid core.
Air Diffuser:	An air distribution outlet designed to direct airflow into desired patterns, usually placed in the ceiling, generally of circular, square or rectangular shape, and composed of divergent deflecting members.
Air Diffusion:	Distribution of the air in a space by means of devices, called air terminal devices, in a manner so as to meet certain specified conditions, such as air change rate, pressure, cleanliness, temperature, humidity, air velocity and noise level.
Air Distribution:	The transportation of a specified air flow to or from the treated space or spaces, generally by means of ductwork.
Air Exchange Rate:	The rate at which outside air replaces indoor air in a space. *(See also Air Changes).*
Air Filter:	A device for cleaning air. There is a wide variety of mechanical filters available, and the range of efficiencies runs from 10% for some types of fiberglass through 99% HEPA filters. They work by arrestance, and their efficiency is usually improved by spraying a light adhesive oil, or tacifier on the filter. Electron filters also filter air. They work by charging dust with an electric charge and then attracting the particles onto a collection plate. Common filter materials are fiberglass, polyester, and cotton.
Air Flow:	The movement of air -- typically defined as that within a defined volume such as a room, duct or plenum.
Air Gap:	The space between magnetic poles or between rotating and stationary assemblies in a motor or generator.
Air Handler:	The indoor part of a central air conditioning or heat pump system that moves cooled or heated air throughout the ductwork of the building. An air handler is usually a furnace or a blower coil. *(See also Air-handling Unit).*
Air Handling Unit (AHU):	The component of HVAC system that is responsible for delivering air through the system and may also clean heat or cool the air. Within the AHU, a portion of the return air from the conditioned space is recirculated and mixed with incoming outside air for conditioning and delivery to the space, and the remainder is exhausted to the outside. AHU may be designed to operate on 100% outside air for critical applications such as operation theaters. The AHU typically contains one or more supply and return fans for maintaining air movement, heating/cooling coils, air filters to condition the air and related equipment such as controls, condensate drain pans etc. The cooling coil and other equipment, as necessary, are used to control the moisture content of the air. The air handler units are available both in

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	standard and custom build units. Does not include ductwork, registers or grilles, or boilers and chillers.
Air Infiltration:	Leakage of air into rooms through cracks, windows, doors and other openings
Air inlet:	Inlets are apertures through which air is intentionally drawn from a conditioned space. Grilles, diffusers and louvered openings can all serve as inlets. Examples are return inlets at ceiling level and floor diffusers that become return inlets for specially designed perimeter heating solutions for open plenum designs. *(See also Air Outlet).*
Air Leakage Rating:	The air leakage rating is a measure of how much air leaks through the crack between the window sash and frame. The rating reflects the leakage from a window exposed to a 25-mile-per-hour wind, and is measured in cubic feet per minute per linear foot of sash crack.
Air Outlet:	Outlets are apertures through which air is intentionally delivered into a conditioned space. Grilles, diffusers and louvered openings can all serve as outlets. Examples are floor and ceiling diffusers. *(See also Air Inlet).*
Air Passages:	Openings through or within walls, through floors and ceilings, and around chimney flues and plumbing chases that permit air to move out of the conditioned spaces of the building.
Air Quality Standard:	A government-mandated regulation that specifies the maximum contaminant concentration beyond which health risks are considered to be unacceptable.
Air Source Equipment:	Heat pumps or air conditioners that use the outdoor air to transfer heat to and from the refrigerant in the unit.
Air Supply Volume:	The volume of supply air flowing through a cross sectional plane of a duct per unit time. Calculated by multiplying air velocity by the cross sectional area of the duct, measured in cubic feet per minute (cfm) or liters per second (L/s).
Air Terminal Device:	A device located in an opening provided at the boundaries of the treated space to ensure a predetermined motion of air in this space.
Air Terminal Device, Lighting Troffer:	An air terminal device, usually in the form of a slot or combination of slots, designed for use with a troffer unit.
Air Terminal Device, Linear:	Air terminal device (grille) with an aspect ratio of 10:1 or more.
Air Terminal Device, Slot:	A device with one or several slots with an aspect ratio of 10:1 or more for each slot (the aspect ratio is the ratio of the length to the width of the closed rectangular opening). A slot may or may not have an adjustable member to vary the direction of the air jet(s) or air flow rate.
Air Terminal Device, Supply:	An air terminal device through which air enters a treated space. It usually consists of one or several deflecting members, which ensure reduction of the air velocity in the occupied zone as well as efficient mixing of the supply air with the air in the treated space. Moreover supply air terminal devices usually determine the direction of the air jet(s).
Air Velocity:	The rate at which air travels in a given direction, measured as a distance per unit time. The units used vary according to the scale of the phenomenon. In the HVAC field, air velocity is commonly expressed as feet per minute (fpm) or meters per second (m/s).
Air Standard Conditions:	Conditions at which Btu ratings for summer air conditioning equipment is rated; 95°F dry bulb, 75°F wet bulb at the condenser inlet and 80°F dry bulb, 67°F wet bulb at the evaporator inlet.
Air Cooled Condenser:	A heat exchanger used to remove the heat of compression plus the heat of absorption of the refrigerant. The refrigerant is circulated in the rows of copper tubes and is exposed to the surrounding air (usually forced air through an axial fan). The copper tubes are bonded with aluminum fins to increase the heat transfer area.
Airflow:	The distribution or movement of air.
Air-Source:	Air is being used as the heat source or heat sink for a heat pump.

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Ak Value (of an air terminal device):	Quotient obtained by dividing a measured air flow rate by a measured air velocity according to a specific process and a specific instrument.
Algaecide:	Normally in tablet form, placed in evaporator drain pan. Used to help slow the growth of bacteria.
Allergens and Pathogens:	A substance that causes an allergic reaction because of an individual's sensitivity to that substance. The substance may be a biological material, including bacteria, viruses, fungi, mold spores, pollens, skin flakes and insect parts. When airborne, they are usually attached to dust particulates of various sizes so that all sizes of airborne particulates may include them.
Allergic Rhinitis:	Inflammation of the mucous membranes in the nose that is caused by an allergic reaction
Alternating Current (AC):	Flow of electricity that constantly changes direction between positive and negative sides. Almost all power produced by electric utilities in the United States moves in current that shifts direction at a rate of 60 times per second.
Ambient Air:	Air in the general surroundings of the space in question, whether an external or internal space. Generally this refers to areas outside of work locations for the building occupants
Ambient Temperature:	Refers to air temperature. It usually means the outside air temperature.
Ambient Controls:	A temperature control switch that will not allow the compressor to operate below a predetermined set point. This control is often set at 55 degrees F if you have an economizer.
Amorphous:	Non-crystalline, having no molecular lattice structure which is characteristic of the solid state. All liquids are amorphous. Amorphous materials that are apparently solid, such as glass, silica gel, etc. lack a definite crystal structure and a well defined melting point. These materials are considered high viscosity liquids. Amorphous materials may be strengthened, reinforced or tempered.
Amperage:	Measurement of the amount of electrical energy that is flowing. One ampere (1 A or Amp) of current is produced in a circuit by 1 volt acting through a resistance of 1 ohm.
Amplification:	An increase in the numbers or concentration of a microbe or its products through reproduction and growth of the microbe.
Angstrom:	A unit of length of one one-hundred-millionth (10^{-8}) centimeter (or 10^{-10} meter or 10^{-7} mm). Used in stating dimensions of molecules, atoms and atomic particles. A water molecule has an effective diameter of 3.2 angstroms.
Anhydrous:	Descriptive of an inorganic compound that does not contain water either adsorbed on its surface or combined as the water of crystallization. Dry compound.
Anode Rod:	A sacrificial rod composed of one or more metals installed in the water heater that protects the tank from corrosion helping extend the life of the tank
Anti Scald Valve:	Device used to prevent high water temperature.
Antimicrobial:	Agent that kills microbial growth.
Approved, Accepted:	The terms “approved” and “accepted” typically mean to permit the use of material, equipment, or methods conditional upon compliance with the Contract Documents.
Approved Equal:	The terms “approved equal” or “approved equivalent” typically mean possessing the same performance qualities and characteristics and fulfilling the same utilitarian function and approved by the Engineer.
APR:	Air Purifying Respirator
ARI:	Air-Conditioning and Refrigeration Institute (ARI) is a non-profit, voluntary organization comprised of heating, air conditioning and refrigeration manufacturers. ARI publishes standards for testing and rating heat pumps and air conditioners to provide a standardized measure of comparison. ARI ensures a level of quality within the industry.

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Asbestos:	A class of silicate minerals composed of long, thin fibers. Their use is banned in most parts of the world due to health hazards associated with its handling.
ASHRAE:	A leading HVAC/R Association - American Society of Heating, Refrigerating and Air Conditioning Engineers - http://www.ashrae.org/. The trade association provides information and sets standards for the industry.
ASME:	American Society of Mechanical Engineers
At No Additional Cost:	The phrase “at no additional cost” typically means at no additional cost to the owner and at no additional cost to the engineer of construction.
Atmospheric Pressure:	The weight of a 1 square inch column of the earth's atmosphere. At sea level this pressure is 14.696 pounds per square inch.
Attrition (Desiccant):	The loss of desiccant material due to chemical, physical or thermal breakdown. The cause of the breakdown may be due to mechanical agitation, thermal cycling or chemical action such as ion exchange or deliquescent properties.
Authority Having Jurisdiction:	The term “authority having jurisdiction” means federal, state, and/or local authorities or agencies thereof having jurisdiction over Work to which reference is made and authorities responsible for “approving” equipment, installation and/or procedures.
Automatic Reset:	A control that senses a condition such as temperature or pressure. The control will turn the unit off if the temperature or pressure exceeds normal limits. Once the condition that caused the unit to stop has changed to a condition that is within the control’s acceptable parameters, the unit will automatically restart.
Auxiliary Heat:	Also called back up heat. Auxiliary heat is the electric strip heaters in the indoor unit that act as a supplement or back up to the heat pump unit.
BTU's:	Unit of measure called "British Thermal Units". It's how we measure cooling and heating components. Each 12,000 British Thermal Units equals 1-ton of cooling or refrigeration.
Ball Valve	A valve that checks flow by seating of a ball. Usually applied in pipes sizes up to 4” and below.
Backflow:	When water travels from one system back into any part of the main distribution system
Backdrafting:	A condition where the normal movement of combustion products from a combustion appliance up a flue is reversed so that the combustion products can enter the building. It is often caused by depressurization of the room where the appliance is located.
Background Concentration:	The level of a contaminant present before the introduction of a new source.
Balance Point:	The lowest outdoor temperature at which the refrigeration cycle of a heat pump will supply the heating requirements without the aid of a supplementary heat source. Usually a temperature between 30°F to 45°F at which a heat pump's output exactly equals the heating needs of the house. Below the balance point, supplementary electric resistance heat is needed to maintain indoor comfort.
Balancing:	The process of adjusting the flow of air in duct systems, or water flow in chiller, hot-water heating or plumbing systems. Proper balancing is performed using accurate instrumentation to deliver the right amount of heating or cooling to each room of the space.
Barometer:	An instrument for measuring atmospheric pressure.
BAS – Building Automation System:	*See EMS, Energy Management System.*

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BCHP:	An acronym for "Buildings Cooling Heating and Power". A concept of using thermally driven prime movers for HVAC equipment and power generation to allow a building to operate independent of the electric power grid. Recovered thermal energy is used by other equipment such as a desiccant dehumidifier, or for heating a building space or water loop. Together, the COP of the installed equipment is higher than that of the prime mover.
Bels:	The rating system by which air conditioner sound is measured. One bel is equivalent to 10 dB. The higher the number, the greater the noise level. The sound of a refrigerator running is rated at 7.0 bels.
Bimetal:	Two metals with different rates of expansion fastened together. When heated or cooled they will warp and can be made to open or close a switch or valve.
Bio-aerosol:	An airborne microbial contaminant, such as a virus, bacteria, fungus, algae, protozoa, or particulate material associated with one of these microorganisms.
Biocide:	Substance or a chemical that kills organisms such as molds.
Biological Contaminants:	Viruses, bacteria, fungi, mammal and bird antigens that are inhaled and can cause many types of health effects including allergic reactions, respiratory disorders, hypersensitivity diseases and infectious diseases. Also referred to as "microbiologicals" or "microbials"
Blower:	An air handling drum type fan for moving air in a distribution system. Blowers v/s Fans: Blowers and fans both produce air movement. Centrifugal blowers (sometimes called a squirrel cage) can produce higher air pressures that make them suitable for duct systems. Axial fans (resemble a propeller) are less expensive, and are usually used when you have little resistance to airflow.
Blower Doors:	Energy contractors use blower doors to see how much air leaks through windows, doors, and other places in your house. The blower door is a large board that blocks the front door of your house. The size and complexity of the fan varies, but all blower doors have adjustable frames around the fan so that they can fit snugly into most doorways. A large powerful variable-speed fan installed in the door blows air into (pressurizes) or sucks air out (depressurizes) a house. Strong draft is created wherever the air is leaking in or out. This can help the contractor locate the air leaks, and gives a good overall indication of how "leaky" a house is.
Boiler Heating Surface:	The area of the heat transmitting surfaces in contact with water (or steam) in the boiler on one side and the fire or hot gases on the other.
Boiler Horse Power:	The equivalent evaporation of 34.5 lbs. of water per hour at 212°F to steam at 212F. This is equal to a heat output of 33,475 Btu per hour, which is equal to approximately 140 sq. ft. steam radiation (EDR)
Boiler:	A closed vessel in which steam is generated or in which water is heated by fire.
Boiling Point:	The temperature at which the addition of any heat will begin a change of state from a liquid to a vapor.
Boot:	A piece of duct used to connect ducts with air terminal device such as registers.
Breathing Zone:	Areas of a room in which occupants breathe as they stand, sit, and lie down.
BRI (Building-Related Illness):	A discrete, identifiable disease or illness that can be traced to a specific pollutant or source within a building. (e.g., Legionnaire's disease, hypersensitivity pneumonitis).

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BTU (British Thermal Unit):	1) BTU is the amount of heat required to raise the temperature of 1 lb of water by 1°F. In air-conditioning terminology 12,000 Btu of heat extraction per hour is equivalent to 1 ton of refrigeration. 2) A standard measure of heat energy in the US commonly used to measure the energy content of various fuels and steam. 3) One Btu is equivalent to 252 calories, 778 foot-pounds, 1055 joules, and 0.293 watt-hours.
BTUH (British Thermal Unit Per Hour):	Establishes a time reference to Btu input or output rates. A Btu per hour is how many BTUs are used per hour.
Buffer zone:	An area within the home between the conditioned zones and the outside. This area is not conditioned (for instance, attics, attached garages, crawlspaces, basements, and enclosed porches).
Building Automation Systems (BAS):	The Building Automation System (BAS) is a direct digital control (DDC) based automation system that allows the building owner/operator, to completely manage the facility i.e., HVAC control, lighting control, fuel monitoring, security management, access control, intrusion detection and system integration from a single point of control. The BAS will also schedule occupancy and control sequences to take advantage of energy savings.
Building Energy Efficiency Standards:	The building codes and energy standards published by the Federal Department of Energy (DOE) and adopted by state or other jurisdictions to control local construction activity (for instance California Code of Regulations, Title 24, Part 2, Chapter 2-53, provides guidelines for energy efficiency of buildings constructed in California) *(See also Model Code Regulations).*
Building Envelope:	The parts of the building: all external building materials, windows, and walls that enclose the building's internal space.
Burner:	A heat producing device where the flame or heat is produced
Butane:	A hydrocarbon gas found in the earth along with natural gas and oil. Butane turns into a liquid when put under pressure. It is sold as bottled gas. It is used to run heaters, stoves and motors, and to help make petrochemicals.
Butterfly Valve:	A valve that consists of a disc that turns and acts as throttle. Typically applied in sizes above 2 inches.
Buy/Sell; Rebate Program:	A program under which an energy marketer buys the gas for you at a market price and then provides it for delivery to you at the approved utility price. If the price paid by the energy marketer for gas is lower than the approved utility price, the difference produces savings which the energy marketer may pass on to you in the form of a rebate check.
Cable Management:	Addresses the distribution, routing and overall organization of cable networks installed in underfloor plenums. Raised floors came into widespread use as a means of containing and concealing the extensive cabling of typical voice, power and data systems, and are now a common feature in contemporary office buildings.
CAE):	Combined Annual Efficiency (CAE) is a measure of the amount of heat produced for every dollar of fuel consumed for both home heating and water heating.
Calorie:	One energy calorie is equivalent to 4.2 joules. It takes 500,000 calories of energy to boil a pot of coffee. One food calorie equals 1,000 energy calories.
Capacitor:	A device used to start a motor or compressor (or to keep it running after start up). For big installations, the capacitors are used for power factor improvement of the electrical system.

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Capacity (or System Capacity):	The output of a piece of cooling or heating equipment. Cooling and heating capacity are normally referred to in BTUs. The capacity of an air conditioner is measured by the amount of cooling it can do when running continuously. The total capacity is the sum of the latent capacity (ability to remove moisture from the air) and sensible capacity (ability to reduce the dry-bulb temperature). Each of these capacities is rated in BTUs per hour (Btu/h). The capacity depends on the outside and inside conditions. As it gets hotter outside (or cooler inside) the capacity drops. The capacity at a standard set of conditions is often referred to as "tons of cooling." One ton of cooling is equivalent to heat extraction rate of 12,000 BTUs per hour.
Capillary Tube:	A refrigerant control consisting of a small diameter tube which controls flow by restriction. They are carefully sized by inside diameter and length for each particular application.
Carbon Dioxide:	(CO_2) A colorless, odorless, non-poisonous gas that is a normal part of the air. In the indoor spaces, the CO_2 is primarily released through respiration. The ASHRAE ventilation standard on indoor air quality limits the concentration of CO_2 to 1,000 ppm maximum.
Carbon Monoxide: (CO)	An odorless, colorless, poisonous and flammable gas that is the product of incomplete fuel combustion as a result of deficient air or improper air-fuel mixture. Sources include cooling and heating appliances, boilers, tobacco smoke, and entrained exhaust from parking garages and truck idling areas.
Carboxyhemogoblin Saturation:	Carbon monoxide poisoning.
Carcinogen:	An agent suspected or known to cause cancer (Fiberglass acoustic insulation)
Ceiling Plenum:	The open space between the suspended and structural ceiling used as part of the air distribution system that accommodates the mechanical and electrical equipment. This space usually accommodates electrical, communications and mechanical connections. The space is kept under negative pressure.
Ceiling-Based Systems:	A ceiling-based air distribution system supplies air to, and removes air from, a conditioned space at ceiling level. Both supply and return grilles are located in the ceiling plane, above which there will be a ceiling plenum of sufficient depth to accommodate the extensive supply ductwork, as well as other building services. Relying on the principle of mixing-type air distribution, ceiling-based supply and return systems are designed to condition the entire volume of the space (floor-to-ceiling), thereby providing a single uniform thermal and ventilation environment. This control strategy provides no opportunity to satisfy different thermal preferences among the building occupants.
Celsius:	A temperature scale based on the freezing (0 degrees) and boiling (100 degrees) points of water. Abbreviated as C in second and subsequent references in text. Formerly known as Centigrade. To convert Celsius to Fahrenheit, multiply the number by 9, divide by 5, and add 32. For example: 10 degrees Celsius x 9 = 90; 90 / 5 = 12; 18 + 32 = 50 degrees Fahrenheit.
Centigrade:	A temperature scale with the freezing point of water at 0 and the boiling point at 1,000 at sea level.
Central Air Conditioner System (Central Chiller System):	A large air conditioning system that is centrally located and produces cold water, which is pumped through the building. The cold water goes through cooling coils in each store or office, which cools the air and removes humidity. Air filtering is often done at the central plant.
Central Air Handling Unit (Central AHU):	This is the same as an Air Handling Unit, but serves more than one area.
Central Forced-Air Heating System:	A piece of equipment that produces heat in a centralized area, then distributes it throughout the home through a duct system.

Terms	Description
Centrifugal Fan:	A device that draws air in axially and discharges it radially.
Ceramic:	Ceramics are made from molten masses of raw materials usually requiring the application of high temperature under controlled conditions in an oven or furnace in order to produce the final properties required for use as an engineering material. The bases of most ceramics are hydrous aluminosilicates. Other raw materials include anhydrous aluminosilicates containing potassium, sodium and calcium. Ceramic filaments or fibers are used to reinforce other materials and to form structural shapes.
CFC: (Chlorofluorocarbons or Chlorinated Fluorocarbons)	A class of refrigerants- Generally refers to the Chlorofluorocarbon family of refrigerants. Sometimes called Freon's. CFCs have been used as refrigerants, solvents and in the production of foam material in great quantities in industry and in consumer products. CFCs when released into the air result in reduction of the stratospheric ozone layer, which protects the Earth's surface from harmful effects of radiation from the sun. The 1987 Montreal protocol on CFCs seeks to reduce their production by one-half by the year 1998. The 1990 CLEAN AIR ACT includes provisions for reducing releases (emissions) and eliminating production and use of these ozone-destroying chemicals.
CFM: (Cubic Feet per Minute)	The amount of air, in cubic feet, that flows through a given space in one minute. 1 CFM equals approximately 2 liters per second (l/s). The higher the number, the more air is being forced through the system. A standard unit delivers typically 400 CFM per ton of air conditioning.
Change Orders:	Change orders (change bulletins) are issued changes or amendments to the Contract Documents. Change orders are issued in written and/or drawing form after acceptance or signing of the Contract.
Charge:	Amount of refrigerant placed in a refrigerating unit.
Check Valve:	A valve designed to permit flow in one direction only. Also known as non-return valve or backflow preventer.
Chemical Sensitization:	Chemical Sensitization is health related phenomenon characterized by effects such as dizziness, eye and throat irritation, chest tightness, and nasal congestion that appear whenever some people are exposed to certain chemicals. People may react to even trace amounts of chemicals to which they have become "sensitized."
Chilled Water System:	There are two types of central air conditioning systems: Direct Expansion (DX) type of central air condition plants and chilled Water type of the central air conditioning plants. In the DX system the air used for cooling the room or space is directly passed over the cooling coil of the refrigeration plant. In case of the chilled water system the refrigeration system is used to first chill the water, which is then used to chill the air used for cooling the rooms or spaces.
Chiller:	A device that produces chilled water to provide air conditioning for large buildings or cooling for process applications. Chiller cools water, usually to between 40 and 50°F for eventual use in cooling air.
Chiller and/or Boiler Optimization:	For facilities with multiple chillers and/or boilers, the most efficient units are selected to meet the existing load with minimum demand and or energy.
Chiller Demand Limiting:	The chiller electrical load is reduced at certain times to meet a maximum pre-specified chiller kW load.
Churn Rate:	This term (%/year) is used to describe the annual percentage of workers and their associated work spaces in a building that are reconfigured or have undergone significant changes. With conventional ceiling-based HVAC systems changes in workspace configurations can be restricted by the location of ceiling grilles. Due to the higher cost associated with reconfiguring overhead ducted systems, these changes are often not made.
Circuit:	One complete run of a set of electric conductors from a power source to various electrical devices (appliances, lights, etc.) and back to the same power source.

Terms	Description
Circuit Breaker:	A device that opens an electric circuit when an overload occurs.
Class I Locations:	Class I locations are those locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.
Class II Locations:	Class II locations are those locations that are hazardous because of the presence of combustible dust.
Class III Locations:	Class III locations are those locations that are hazardous because of the presence of easily ignitable fibers or flyings, but in which the fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.
Clean Air Act:	The clean air act establishes guidelines for reductions in air pollution. The 1990 Clean Air Act Amendments include revised provisions for attainment and maintenance of National Ambient Air Quality Standards, mobile sources, hazardous air pollutants, and other assorted air quality issues. The act also specifically limits sulfur dioxide and nitrogen oxide emissions of power plants.
Clear Zone:	During the placement of floor diffusers, a clear zone is typically defined as an imaginary cylinder of specified diameter around the center point of the diffuser. Clear zones are generally 0.9-1.8 m (3-6 ft) in diameter, depending on manufacturer's data, and represent an area within which long-term occupancy is not recommended.
Closed System:	1) A system where the incoming cold water supply has a device that will not allow water to expand when heated (i.e. check valve, back flow preventer, some pressure reducing valves) 2) A type of piping distribution system that is not open to atmosphere, for example the chilled water system is a closed system while the cooling water system using a cooling tower is an open system.
Clo Value:	Insulation values for clothing ensembles from ASHRAE.
CO_2 Sensor:	Carbon dioxide sensor. A device for regulating fresh air. A better way to control the amount of fresh air that is brought into the building. The CO_2 sensor samples the air in the space and opens and closes the outside air dampers to bring in more or less fresh air based on the amount of CO_2.
Coanda Effect:	Coanda effect is the phenomena in which a jet flow attaches itself to a nearby surface and remains attached even when the surface curves away from the initial jet direction. Applied to HVAC distribution systems, such as diffusers, registers etc.
Codes:	Building codes require, among other things, that we have a minimum amount of outside air for each person. Usually this is around 10 to 12 cubic feet per minute (CFM) per person. Sometimes the CFM is based on the square feet of the building.
Coefficient of Performance:	A ratio of the heating capacity in watts [W] to the power input values in watts [W] at any given set of rating conditions expressed in watts/watts [W/W]. For heating COP, supplementary resistance heat shall be excluded. *(See also COP).*
Cogeneration:	Simultaneous production of two or more forms of useable energy from a single fuel source, e.g., heat energy and electrical or mechanical power, in the same facility. Because a typical cogeneration facility uses thermal energy which is generally vented in a traditional power plant, the process can be 50 to 70 percent more efficient. Most cogeneration systems are designed to simultaneously produce electric power and thermal heat for industrial processes or the heating and cooling of buildings.
Coil:	A cooling or heating element, often including fins, through which treated gas or liquid is passed, exchanging thermal energy with air surrounding it for heating or cooling. A direct expansion (DX) system uses coil tubes filled with refrigerant while chilled water system uses coil tubes filled with chilled water. Cooling coil is also called evaporator coil. Heat rejection coil is called condenser coil.

Terms	Description
Coil Cleaning:	Air conditioning coils are heat exchangers. The evaporator and condensing coils need to be cleaned periodically. You can simply brush clean the coils, clean the coils with a hand sprayer with chemical cleaners or use power sprayers with chemical cleaners.
Colony Forming Unit: (CFU)	A laboratory measure of fungal concentration, indicating the quantity of viable organisms collected for a given unit sample.
Column Radiator:	A type of direct heater.
Combination Foundations:	Buildings constructed with more than one foundation type; e.g., basement/crawlspace or basement/slab-on-grade.
Combustion Blower:	A motor-blower combination used to draw combustion gasses through the heat exchanger and vent outside or into a chimney.
Combustion Chamber:	The location where combustion takes place.
Comfort Conditioning:	The process of treating air to simultaneously control its temperature, humidity, cleanliness, and distribution to meet the comfort requirements of the occupants of the conditioned space.
Comfort Zone:	The range of temperatures, humiditys and air velocities at which the greatest percentages of people feel comfortable.
Commercial Application:	Water heaters used for more than a single family dwelling.
Commercial:	The commercial sector is generally defined as non-manufacturing business establishments, including hotels, motels, restaurants, wholesale businesses, retail stores, and health, social, and educational institutions. The utility may classify commercial service at all consumers whose demand or annual use exceeds some specified limit. The limit may be set by the utility based on the rate schedule of the utility.
Commissioning:	An activity commenced at completion of construction and often including initial user occupancy, intended to allow designers and managers to check functional subsystems, to determine that the facility is functioning properly, and to undertake any necessary remedial action. The term “commissioning” is the methodical procedures and methods for documenting and verifying the performance of HVAC systems so that the systems operate in conformity with the design intent. Commissioning will include testing; adjusting; balancing; documentation of occupancy requirements and design assumptions; documentation of design intent for use by contractors, owners, and operators; functional performance testing and documentation necessary for evaluating the HVAC systems for acceptance; adjusting the HVAC systems to meet actual occupancy needs within the capability of the systems. Commissioning does not include system energy efficiency testing or testing of other building systems such as building envelope, structure, electrical, lighting, plumbing, fire protection and life safety. The purpose of commissioning of HVAC systems is to achieve the end result of a fully functional, fine-tuned HVAC system.
Compressor:	The heart of an air conditioning or heat pump system. The large part (usually black) in the condenser (outdoor unit) that pumps refrigerant. The compressor draws a low pressure refrigerant and compresses the gas into the high pressure or condensing side of the cycle. There are four types of compressors: reciprocating, rotary, scroll, and centrifugal. Most residential systems have reciprocating compressors. The reciprocating and scroll compressors are available up to 100 ton capacity. For commercial applications screw compressor up to 750 tons and centrifugal compressors up to 2,000 tons are widely used. From an energy efficiency point of view, the centrifugal compressors are the best and consume as low as 0.5 kWh per ton followed by screw 0.6 to 0.8 kWh per ton and reciprocating 0.75 to 0.95 kWh per ton.

Terms	Description
Compressor Oil:	Lubricating oil used in compressors. Today the choices are MO, AB, POE, PAG oil used in refrigeration units are specially prepared for refrigeration use. Mineral-based oils are used for years with chlorine refrigerants. The new oils are synthetic oils, and they are POL or Polyol Ester, PAG, or Polyalkylene Glycol, and AB or Alkylbenzene.
Compression:	The reduction of volume of a vapor or gas by mechanical means.
Compression Ratio:	The ratio determined by dividing the discharge pressure, in PSI, by the suction pressure in PSI.
Compressor - Start Capacitor:	On larger compressors, sometimes you need a "boost" to get them started. A compressor Start -capacitor, is a capacitor that has an extremely high storage rating. When the compressor comes on, it assists in starting it, and then a relay takes it out of the circuit.
Compressor - Run Capacitor:	This is a large capacity run capacitor for a compressor motor. Works exactly the same, but has a higher storage rating.
Condensate Drain Lines:	This is the line that runs from the indoor unit to somewhere outside. It carries the water that is condensed on the evaporator coil as it is removed from the air in your home. This line is susceptible to clogging, and needs a good cleaning once a year.
Condensate:	1) In steam heating, water formed by cooling steam as in a radiator. The capacity of traps, pumps, etc. is sometimes expressed in lbs. of condensate that can be handled per hour. One lb. of condensate per hour is equal to approximately 4 sq.ft. of steam heating surface (240) Btu per hour per sq.ft. 2) In chilled water or direct refrigerant cooling, the water is condensed on the cooling (evaporator) coil. The condensate water is formed as a result of moisture in air coming in contact with the apparatus at dewpoint temperature.
Condensation Point:	The temperature at which the removal of any heat will begin a change of state from a vapor to a liquid.
Condenser:	A device that transfers heat out of a refrigeration system to a medium (either air, water, or a combination of air and water) that absorbs the heat and transfers it to a disposal point. There are three types of condensers: air-cooled condensers, water-cooled condensers, and evaporative condensers. The evaporative condenser uses a combination of air and water as its condensing medium. For small sizes, an air-cooled condenser is preferred. An air-cooled condenser is also preferred where water is scarce, or can't be used due to noise or health reasons of legionella disease. The air-cooled systems are easy to install and are usually less expensive. The efficiency is relatively poor as compared to water cooled condensers. The water cooled condenser is considered for large applications; usually over 100 tons. The heat is rejected in the condenser and further through the cooling tower.
Condenser Approach Temperature:	The temperature difference between the condenser's refrigerant temperature and the leaving condenser water temperature. A high approach indicates low condenser water leaving temperature, which indicates fouling of the condenser tubes. This can significantly degrade chiller efficiency.
Condenser Coil:	The outdoor portion of an air conditioning or heat pump system that serves as a heat transfer point for dispelling heat to the outside air, as in an air conditioner or heat pump in the summer; or for collecting heat from the outside air, as in a heat pump in the winter. Also called the outdoor coil, this coil is placed outdoors. Refrigerant that has collected heat from inside your home ends up in this coil. In the form of hot gas, it is pumped through this coil at as much as 140 degrees. The fan pulls air across the coil thus extracting heat from it. This is why you feel "hot air" blowing off your outdoor A/C.

Terms	Description
Condensing Medium:	The substance, usually air or water, to which the heat in a condenser is transferred.
Condensing Unit:	The portion of a refrigeration system where the compression and condensation of refrigerant is accomplished. Sometimes referred to as the 'high side'. This is the outdoor section of a split system air conditioning system.
Conditioned:	The term “Conditioned” usually means rooms, spaces, or areas that are provided with mechanical heating and cooling.
Conditioned Air:	The air that has been heated, cooled, humidified, or dehumidified to maintain an interior space within the "comfort zone." Typically air-conditioning is achieved in an AHU, by altering one or more of the following properties: temperature, humidity, cleanliness (filtering), or mixture of outside and recirculated air.
Conditioned Floor Area:	The floor area of enclosed conditioned spaces on all floors measured from the interior surfaces of exterior partitions for nonresidential buildings and from the exterior surfaces of exterior partitions for residential buildings.
Conditioned Space:	A space within a building served by an HVAC system supplying conditioned air in order to achieve acceptable thermal comfort and indoor air quality conditions.
Conditioned Space, Directly:	An enclosed space that is provided with heating equipment that has a capacity exceeding 10 Btus/ (hr-ft2), or with cooling equipment that has a capacity exceeding 10 Btus/ (hr-ft2). An exception is if the heating and cooling equipment is designed and thermostatically controlled to maintain a process environment temperature less than 65° F or greater than 85°F for the whole space the equipment serves.
Conditioned Space, Indirectly:	Enclosed space that: 1) has a greater area weighted heat transfer coefficient (u-value) between it and directly conditioned spaces than between it and the outdoors or unconditioned space; (2) That has air transferred from directly conditioned space moving through it at a rate exceeding three air changes per hour.
Conductance:	The quantity of heat, in Btu's, that will flow through one square foot of material in one hour, when there is a 1 degree F temperature difference between both surfaces. Conductance can be expressed in other units as well. Conductance values are given for a specific thickness of material, not per inch thickness.
Conduction:	The transfer of heat from molecule to molecule within a substance.
Configuration:	This describes the direction in which a furnace outputs heat. A furnace may have an upflow, down flow or cross flow (horizontal) configuration.
Confined Spaces:	Confined spaces (according to OSHA Regulations) are spaces which must have these three characteristics: 1. The space must be large enough and configured to permit personnel to enter and work. 2. The space is not designed for continuous human occupancy. 3. The space has limited or restricted means of entry and exit.
Constant Air Volume Systems:	An air handling system that provides a constant air flow while varying the temperature to meet heating and cooling needs. Alternatively a variable air volume (VAV) system can be employed in which the air flow volume is varied, while the temperature remains constant.
Contactor:	An electromagnetic actuated relay. Usually used to refer to the relay which closes the circuit to a compressor or the main switch that turns the condenser on.
Contaminant:	An unwanted constituent that may or may not be associated with adverse health or comfort effects.
Contract:	A set of documents issued by the Owner for the Work, which may include the Contract Documents, Confidentiality Agreement, the Advertisement, Form of Proposal, Free Competitive Bidding Affidavit, Affidavit as to Taxes, Certification of Bidder, Disadvantaged Business Enterprise Forms,

Terms	Description
	Bid Bond, Agreement, Waiver of Right to File Mechanics Lien, Performance Bond, Labor and Material man's Bond, Maintenance Bond(s), Certification Regarding Lobbying, Disclosure Form to Report Lobbying, and other forms that form part of the Contract as required by the Owner and the Contract Documents.
Control Devices:	The term "control devices" means the sensing and switching devices such as thermostats, float and electro-pneumatic switches controlling the operations of mechanical and electrical equipment.
Convection:	The transfer of heat by a moving fluid.
Conventional Systems:	A typical, conventional HVAC, (air distribution) system supplies air to, and remove air from, a conditioned space at ceiling level. Both supply and return grilles are located in the ceiling plane, above which there will be a ceiling plenum of sufficient depth to accommodate the extensive supply ductwork, as well as other building services. Relying on the principle of mixing-type air distribution, ceiling-based supply and return systems are designed to condition the entire volume of the space (floor-to-ceiling), thereby providing a single uniform thermal and ventilation environment. This control strategy provides no opportunity to satisfy different thermal preferences among the building occupants. Essentially a constant air volume (CAV) system.
Converter:	A piece of equipment for heating water with steam without mixing the two.
Cooling Anticipator:	A resistance heater (usually not adjustable) in parallel with the cooling circuit. It is 'on' when the current is 'off", adding heat to shorten the off cycle.
Cooling Capacity, Latent:	Available refrigerating capacity of an air conditioning unit for removing latent heat (moisture) from the space to be conditioned.
Cooling Capacity, Sensible:	Available refrigerating capacity of an air conditioning unit for removing sensible heat (temperature) from the space to be conditioned.
Cooling Capacity, Total:	Available refrigerating capacity of an air conditioner for removing sensible heat and latent heat from the space to be conditioned.
Cooling Capacity:	A measure of the ability of a unit to remove heat from an enclosed space.
Cooling Degree Day:	A unit of measure that indicates how heavy the air conditioning needs are under certain weather conditions.
Cooling Load Temperature Difference: (CLTD)	A value used in cooling load calculations for the effective temperature difference (delta T) across a wall or ceiling, which accounts for the effect of radiant heat as well as the temperature difference.
Cooling Load:	1) The rate at which heat must be extracted from a space in order to maintain the desired temperature within the space. 2) In the context of HVAC systems, the cooling load of a space is the amount of heat generated within that space (from any source) which the HVAC system must remove. Sources of heat in an office space typically include occupants, electrical equipment, artificial lighting and solar radiation through the building envelope.
Cooling System:	A system of air-to-air, liquid-to-air, liquid-to-liquid heat exchangers, ducts and/or pipes, etc. for removing heat from a system containing heat sources, such as power plants, automobile engines, and homes.
Cooling Tower:	A heat transfer device, which cools warm water using outside air. The common terms used in cooling tower terminology are: 1) Approach = Leaving water temperature – ambient wet bulb temperature (usually 4 deg) 2) Range = Entering water temperature – Leaving water temperature (usually 8 to 16 deg) 3) Drift = Water loss through cooling tower shell usually 0.5 to 1%. 4) Evaporation = The water lost as a result of evaporative cooling (usually 1.5 to 2.5%) 5) Blow down = The water intentionally drained to maintain the water chemistry.

Terms	Description
COP:	Rating used primarily in heat pumps. Compares the heat produced by the heat pump to the heat you would get from resistance heat. You can also multiply the EER by .293. COPs vary with the outside temperature: as the temperature falls, the COP falls also, since the heat pump is less efficient at lower temperatures. ARI standards compare equipment at two temperatures, 47° F and 17°F, to give you an idea of the COP in both mild and colder temperatures. Geothermal equipment is compared at 32°F enter water temperature. COP & HSPF cannot be compared equally. Air Source Equipment is rated by HSPF or COP and Geothermal equipment is rated by COP.
Core Zone:	Typically the area at the center of the floor plan containing the services and circulation spaces -- such as the elevator shaft, fire escape stairs and equipment room. The AHU is also often located in this zone.
Crankcase Heater:	An electrical resistance heater that is used to keep the compressor warm. The purpose of the heater is to keep any refrigerant in the compressor in a vapor state. Crankcase heaters usually operate 100 percent of the time and they protect the compressor by keeping liquid refrigerant out of the compressor.
C-Trol:	A method of control that prevents the formation of condensate at the point of measurement (cold water pipe, bulkhead, etc.). Used in conjunction with a DESICAiR dehumidifier.
Cubic Feet per Minute (CFM):	A common means of assigning quantitative values to volumes of air in transit, usually abbreviated as CFM.
Curb:	An adapter for mounting a rooftop unit on a roof. The roof is flashed or connected to the curb and the rooftop unit is placed on the curb with gaskets.
Current: (Electric)	A flow of electrons in an electrical conductor. The strength or rate of movement of the electricity is measured, e.g., in amperes.
Cycle:	The complete course of operation of a refrigerant back to a selected starting point in a system. Also used to describe alternating current through 360 space degrees.
Damper:	Dampers are movable obstruction to airflow. In the open position they pass maximum air and in the closed position they restrict the flow of air. There is often a minimum position and this will allow a minimum of air to pass providing a minimum amount of required ventilation. Dampers are used effectively in zoning to regulate airflow to certain rooms. There are basically two types of dampers: Manual and motorized. A motorized damper is generally used in a zoned system to automatically deliver conditioned air to specific rooms or zones. *(See also Zoning).*
DCV – Demand Controlled Ventilation:	DCV saves energy by ensuring that the proper amount of mechanical ventilation is supplied by continuously monitoring spaces and occupancy conditions by measuring CO_2 concentrations. Significant energy can be saved when used in conjunction with typical VAV designs.
DDC:	Direct Digital Control
Decibel (dB):	A decibel describes the relative loudness of a sound. Some common sounds are fairly close to a typical air conditioner or heat pump's sound level: human voice, 7.0 decibels; blender, 8.8 decibels.
Defrost Cycle:	The process of removing ice or frost buildup from the outdoor coil during the heating season.
Defrost:	A cycle that only a heat pump has. When the heat pump is in heating mode, the flow of refrigerant is reversed through the reversing valve. As the outdoor coil is now the evaporator coil, water collects on it like it does on the indoor coil. When temperatures fall below freezing, the water freezes on the coil and a defrost cycle must melt it off. Most defrost cycles are time initiated, about every 90 minutes of run time.

Terms	Description
Degree Day:	1) A unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal annual heating load of a building. When the mean temperature is less than 65°F the heating degree days are equal to the total number of hours that temperature is less than 65 degrees Fahrenheit for an entire year. 2) A unit which is the difference between 65° F and the daily average temperature when the latter is below 65° F. The "degree days" in any one day is equal to the number of degrees F that the average temperature for that day is below 65°F.
Degree Rise:	Difference between the starting water temperature and the ending temperature after heating is complete
Dehumidification:	The removal of water vapor from air. Dehumidification can be accomplished by cooling an air stream to below its dew point temperature causing the condensation of vapor or by desiccant adsorption/absorption resulting in removal of humidity from air in the vapor phase.
Deliquescent:	Tendency of a material to absorb atmospheric moisture (humidity) and become liquid. The term "deliquescent" refers specifically to water-soluble chemical salts (e.g. lithium chloride) in the form of powders that are dissolved by the moisture absorbed from air.
Delta: (or Delta T)	A difference in temperature. Often used in the context of the difference between the design indoor temperature and the outdoor temperature.
Demand Billing:	The electric capacity requirement for which a large user pays. It may be based on the customer's peak demand during the contract year, on a previous maximum or on an agreed minimum. Demand billing is measured in kilowatts.
Demand:	The rate at which electricity or natural gas is delivered to or by a system, part of a system, or piece of equipment, e.g., to end users, at a given instant or averaged over any designated period of time. Electricity demand is typically expressed in kilowatts.
Demand Charge:	The sum to be paid by a large electricity consumer for its peak usage level.
Demand Limiting:	Temporarily shedding electrical loads to prevent exceeding a peak value.
Density:	Mass or weight per unit of volume. For example, standard air = .075 pounds per cubic foot.
Desiccant:	Generally, a hygroscopic substance such as silica gel, molecular sieve, activated alumina, etc. having the ability to adsorb moisture from air and be reactivated (regenerated) by thermal or other means without loss of physical properties. The other category of absorbing materials is called 'Deliquescent' which is defined as tendency of a material to absorb atmospheric moisture (humidity) and become liquid. Desiccants are used to maintain a dry (dehumidified) air stream or environment.
Desiccant Cooling:	The use of desiccant dehumidification systems for latent heat (humidity) removal in air conditioning systems in conjunction with sensible heat transfer or evaporative cooling equipment to perform cooling without the use of or with supplemental use of vapor compression equipment. Desiccant cooling equipment is used to treat outdoor air by reducing both sensible and latent (temperature and humidity) loads during cooling seasons. Some systems also include winter heating and humidification components for all season service.

Terms	Description
Desiccant Dehumidification:	Passive or Static: The removal of moisture from air by exposing the humid air to a desiccant without the use of an air moving device. Once the desiccant achieves moisture equilibrium with the ambient air, the dehumidification process stops and the desiccant must be replaced with active desiccant or removed and reactivated, e.g. packaged or "bagged" desiccant placed in shipping containers for the purpose of preventing moisture condensation during transit or storage; laboratory desiccators.
Desiccant Dehumidification:	Dynamic or Active: The removal of moisture from air by exposing the humid air to a desiccant with the use of an air moving device and a concurrent reactivation (regeneration) process such as by applying thermal heat or pressure swings. The reactivation process can be either intermittent such as for "dual tower" dehumidifiers or concurrent and continuous such as for "rotary" dehumidifiers.
Desiccant Ventilation:	The removal of moisture from air by exposing the humid air to a desiccant with the use of an air moving device and a concurrent reactivation (regeneration) process which is solely dependent upon the difference in the partial vapor pressure of moisture between the ventilation (outdoor) air and exhaust air streams, e.g. an enthalpy wheel. Enthalpy wheels are used to reduce the impact of ambient temperature and humidity of ventilation air on cooling and heating systems. Increased rates of ventilation air are recommended to maintain good Indoor Air Quality (reference ASHRAE Standard 62-1989 currently under continuous maintenance).
Design Conditions:	Cooling loads vary with inside and outside conditions. A set of conditions specific to the local climate are necessary to calculate the expected cooling load. Inside conditions of 75°F and 50% relative humidity are usually recommended as a guideline. Outside conditions for a particular geographical location and topography are selected for the 2.5% design point.
Designers:	Architects, engineers, and other professionals responsible for making technical recommendations about a facility's configuration, materials, mechanical systems, and other characteristics that determine future performance and cost.
Desorption:	The removal (release) of adsorbed moisture from a desiccant.
Detailed:	The term “detailed” is a cross-reference to graphic representations, details, notes, or schedules on the Contract Drawings and to similar means of recording requirements in the Contract Documents.
Dewpoint:	The temperature at which an air sample is saturated with water vapor (100% relative humidity). Cooling of the sample below the dewpoint temperature would cause condensation of the water vapor to occur. The more negative the dewpoint temperature is from the ambient temperature the less the risk of condensation and the drier the gas or air stream.
Dew-Trac:	A method of dehumidifier capacity control which assures a constant dewpoint value at the point of measurement (return air, supply air, room/space) in conjunction with a desiccant dehumidifier.
Dielectric:	A nonconductor of direct electric current
Diffusers:	A diffuser is the mechanical device that is designed to control the delivery of air via a damper. Diffusers are used on both all-air and air-water HVAC systems, as part of room air distribution subsystems, and serve several purposes: • To deliver both conditioning and ventilating air • Evenly distribute the flow of air, in the desired directions • To enhance mixing of room air into the primary air being discharged • Often to cause the air jet(s) to attach to a ceiling or other surface, taking advantage of the Coandă effect • To create low-velocity air movement in the occupied portion of

Terms	Description
	room • Accomplish the above while producing the minimum amount of noise Diffusers may be round, rectangular, textile or linear slot diffusers (LSDs), for example. This last type takes the form of one or several long, narrow slots (hence the name), often semi-concealed in a fixed or suspended ceiling. Occasionally, diffusers are used in reverse fashion, as air inlets or 'returns'. This is especially true for LSDs and 'perf' diffusers. But more commonly, grilles are used as return or exhaust air inlets.
Dilution:	A mitigation strategy that lowers the concentration of airborne contaminants by increasing the fraction of outdoor air in the supply air stream.
Dip Tube:	Tube inside the water heater that sends cold water to the bottom of the tank
Direct Current: (DC)	Electricity that flows continuously in the same direction.
Direct Expansion: (Refrigeration)	The direct expansion (DX) system refers to the cooling effect obtained as a result of direct heat exchange of air and the refrigerant in the tubes of the heat exchanger coil. The indirect system uses chilled water in place of the refrigerant, i.e. refrigerant first cools the water and chilled water is used to exchange heat with air.
Direct Gas-Fired Heater:	The burner fires directly in the air stream being heated, rather than through a heat exchanger. 100% of available BTUs are delivered to the heated space because no flue or heat exchanger is required. This results in no wasted energy.
Direct Vent:	Pulls outside air for combustion and vents combustion gases directly outside.
Direct-Return System (Hot Water):	A two-pipe hot water system in which the water, after it has passed through a heating unit, is returned to the boiler along a direct path so that the total distance traveled by the water from each radiator is the shortest feasible. There is, therefore, a considerable difference in the lengths of the several circuits composing the system.
Discharge Line:	A tube used to convey the compressed refrigerant vapor from the compressor to the condenser inlet.
Discharge Pressure:	The pressure read at the compressor outlet. Also called head pressure or high side pressure.
Disinfectants:	Antimicrobials are a disinfectant when it destroys or irreversibly inactivates infectious or other undesirable organisms, but not necessarily their spores. EPA registers 3 types of disinfectant products as either 1) Limited 2) General or broad spectrum and 3) Hospital disinfectant.
Displacement Ventilation:	In displacement ventilation systems (used for cooling only), low-velocity supply air at a temperature below room temperature is introduced into the occupied zone of a space at low level -- diffusers are usually configured as large-area floor pedestals or low side-wall. By extracting air from the space at ceiling level, an overall floor-to-ceiling air flow pattern is produced. This upward movement of air in the room takes advantage of the natural buoyancy of heat gain to the space. As air is heated and rises into the region above the occupied zone, some of it exits the space with only partial mixing with the room air. Displacement ventilation systems aim to minimize mixing of supply air with room air; therefore, maintaining conditions in the occupied zone as close as possible to that of the conditioned supply air, leading to improved air change effectiveness.
DOA – Dedicated Outside Air:	Decoupling ventilation from heating/cooling can allow both to be optimized separately.
DOE:	The Department of Energy. A federal agency that sets industry efficiency standards and monitors the use of various energy sources.

Terms	Description
Domestic Hot Water:	Hot water used for purposes other than for house heating such as for laundering, dishwashing, bathing, etc.
Double Glazing:	Windows having two sheets of glass with airspace in between. The airspace may be filled with inert gas.
Downflow Furnace:	A furnace that pulls in cool return air from the top and blows/expels warm air at the bottom. This is common where a furnace must be located in a second-floor closet or utility area.
Draft Diverter:	A device fitted in the flue way of a gas appliance to prevent updraft, downdraft or the secondary flue blockage from obstructing the escape of products of combustion or otherwise affecting the normal operation of the appliance.
Draft:	Movement of air causing undesirable local cooling of a body due to one or more of the following factors: low air temperature, high velocity or inappropriate air flow direction.
Drain pans/Drain lines:	The condensate system uses a drain pan beneath the evaporator coil to collect the condensate. The drain lines or drain piping is used to provide a path for the water to flow away from the unit into an approved drain or area.
Drain Tile Loop:	A continuous length of drain tile or perforated pipe extending around the internal or external perimeter of a basement or crawlspace footing.
Drain Trap:	A dip in the drain pipe of sinks, toilets, floor drains, etc., which is designed to stay filled with water, thereby preventing sewer gases from escaping into the room.
Drain Valve:	Device designed to allow drainage of stored contents from a water heater
Drawings (Documentation):	The terms “drawings” mean all diagrams and details pertaining to the construction or plans, sections, elevations, profiles, and details of the Work contemplated and its appurtenances. The term “shop drawings” includes drawings, diagrams, schedules, performance characteristics, charts, brochures, catalog cuts, calculations, certified drawings, and other materials prepared by the Contractor, Sub-Contractor, Manufacturer, or Distributor ,which illustrate some portion of the Work as per the requirements of the Contract Documents used by the Contractor to order, fabricate and install mechanical and electrical equipment and systems in a building.
Drier:	Sometimes called filter/drier, it removes moisture and keeps the refrigerant clean.
Dry Air:	Air containing no moisture (humidity). Dry air is a mixture of several gases, the composition of which varies with altitude and other conditions at the point of measurement. "Standard Air" used in scientific and HVAC calculations is dry air by definition with a density of 0.075 lb/ft3 at 68°F, 29.921" Hg (1.29 g/liter at 0 °C, 760 mm Hg). However, dry air does not exist in nature due to atmospheric moisture which directly affects the density of air. In HVAC work, "dry air" is air referred to as air with a humidity value that is lower then the ambient air. The degree of dryness is determined by measuring and comparing relative humidity or dew point temperature of the "dry" air and the ambient air.
Dry Bulb Temperature: (DBT)	A measure of the sensible temperature of air. (Temperature measured by an ordinary thermometer.)
Dry Return (Steam):	A return pipe in a steam heating system which carries both water of condensation and air located above the water line of the heating boiler.
Dry Handler:	A desiccant dehumidifier module designed to be installed with other air handling equipment. The unit includes the desiccant section housed in a cabinet with service plenums, a reactivation heater or heat exchanger, reactivation blower and controls.
Dual Element Heater:	An electric water heater with an upper and lower element for heating water.
Dual Fuel System:	A dual heating system, for example a heat pump and a fossil fuel furnace.

Terms	Description
Dual-Duct System:	A central plant heating, ventilation and air conditioning (HVAC) system that produces conditioned air at two temperatures and humidity levels. The air is then supplied through two independent duct systems to the points of usage where mixing occurs.
Duct tape:	For effective sealing the surface, a sticky tape is applied to seal the duct connection. Duct tape has a tendency to lose adhesion with age, especially when used on ducts in unconditioned spaces. Care must be taken when it is applied.
Duct:	A duct is an encased conduit, usually constructed of sheet metal and having a round, square, or rectangular cross-section, through which air moves around an HVAC system. Other types of duct construction include fibrous glass ducts (rigid fiberglass with aluminum facing) and flexible ducts (used to connect diffusers, mixing boxes, and other terminal units to the air distribution system).
Ductwork:	The duct work, or duct system, is similar to thin wall piping, and is used to deliver conditioned air to the respective areas to be conditioned. The system is designed to deliver the correct amount of air to each area. The term "ductwork" includes ducts, fittings, flanges, dampers, insulation, hangers, supports, access doors, housings, and all other appurtenances comprising a complete and operable system. The ductwork typically connects the air handling unit to supply, return and fresh ducts. The terminal of the ductwork is connected to the grilles, diffusers and registers/or registers. Ductwork can be exposed or concealed within floor or ceiling plenums, services zones and plant rooms.
Dust:	Particles in the air that settle on surfaces. Some settle quickly and can be trapped by the body's defense mechanisms, while small particles are capable of passing through the body's defenses and entering the lungs.
Duty Cycle:	Duty Cycling – Shutting down equipment for predetermined short periods of time during normal operating hours.
DX System:	There are two types of central air conditioning systems: Direct Expansion (DX) type of central air condition plants and Chilled Water type of the central air conditioning plants. In the DX system the air used for cooling the room or space is directly passed over the cooling coil of the refrigeration plant. In case of the chilled water system the refrigeration system is used to first chill the water, which is then used to chill the air used for cooling the rooms or spaces.
Economizer:	Mechanical devices intended to reduce energy consumption. In simple terms, an economizer is a heat exchanger. Air-side economizers can save energy in buildings by using cool outside air as a means of cooling the indoor space. Temperature control is achieved by mixing return air from the building with the outdoor air to achieve the desired mixed air or supply air temperature. In most cases, the process requires some sort of relief system to allow the excess air brought into the building to exit without creating a pressurization problem. The process must also be coordinated with the ventilation requirements to ensure that there is always enough outdoor air brought into the building to meet the ventilation requirements. In addition, the control of the process must be coordinated with the other heat transfer elements in the system like the preheat coil and cooling coil to prevent energy waste. When the outside air is both sufficiently cool and sufficiently dry, the amount of enthalpy in the air is acceptable to the control and no additional conditioning of it is needed. This portion of the air-side economizer control scheme is called free cooling. Air-side economizers can reduce HVAC energy costs in cold and temperate climates while also potentially improving indoor air quality, but are most often not appropriate in hot and humid climates. It is commonly held that raising outdoor air flow rates to accommodate

Terms	Description
	indoor air quality needs will dramatically increase energy use because this increased outdoor air must be conditioned. However, this conventional wisdom ignores the dynamics of energy use of different systems during different seasons. With the appropriate controls economizers can be used in climates which experience various weather systems.
Economizer, Air:	A ducting arrangement and automatic control system that allows a heating, ventilation and air conditioning (HVAC) system to supply up to 100 percent outside air to satisfy cooling demands, even if additional mechanical cooling is required.
Economizer, Water:	A system which uses either direct evaporative cooling, or a secondary evaporative cooled water loop and cooling coil to satisfy cooling loads, even if additional mechanical cooling is required.
EER: (Energy Efficiency Ratio)	1) A ratio calculated by dividing the cooling capacity in Btu's per hour (Btuh) by the power input in watts under ARI-specified test conditions, expressed in Btuh per watt (Btuh/watt). 2) The rating that Underwriter Laboratories (UL) gives each unit when it is tested for compliance with energy laws. It is, in fact, the rating of the equipment. 3) EER & SEER cannot be compared equally. Air source equipment is rated by SEER and geothermal equipment is rated by EER. EER changes with the inside and outside conditions, falling as the temperature difference between inside and outside gets larger.
Effective Area: (of an air terminal device)	The smallest net area of an air terminal device used by the air stream in passing through the air terminal device.
Effective Temperature:	An arbitrary concept which combines into a single value the effect of temperature, humidity, and air movement as sensed by the human body.
Efficiency:	A products ability to utilize input energy; expressed as a percentage.
Electric Radiant Heating:	A heating system in which electric resistance is used to produce heat which radiates to nearby surfaces. There is no fan component to a radiant heating system.
Electric Rate Schedule:	A statement of the electric rate and the terms and conditions governing its application, including attendant contract terms and conditions that have been accepted by a regulatory body with appropriate oversight authority.
Electric Resistance Heater:	A device that produces heat through electric resistance. The heat can be transferred through a fan or may flow with natural convection.
Electric Strip Heater:	An electric resistance heater usually installed in the duct system. Sometime electric strip heaters are the sole source of heat, and in some cases they provide supplemental heating.
Electrostatic Air Cleaner:	A device that uses an electrical charge to trap particles traveling in the air stream.
Emergency Heat: (Supplementary Electric Heat)	The back up electric heat built into a heat pump system. The same as an auxiliary heater, except it is used exclusively as the heat source when the heat pump needs repair.
Emission Standard:	A voluntary guideline or government regulation that specifies the maximum rate at which a contaminant can be released from a source.
Emissivity:	The ability of a material to re-radiate heat. E=1.00 implies all heat is re-radiated, E=0 implies no heat is re-radiated. Shiny metals have a low emissivity. Most building materials have an emissivity around 0.90.
EMS (Energy Management System):	A system that is designed to reduce energy costs. It can be as simple as a night setback thermostat or motion sensor lighting control, or more complicated such as measuring the amount of carbon monoxide in the air and regulating the outside air or fresh air intake to the building. Some EMS will monitor current consumption to a building. They will shed (turn off) loads such as the HVAC for short periods of time. The EMS will then shut off another unit before restarting the last one turned off. This will reduce the electric demand peaks in energy consumption, which many electric utilities use to penalize the customer.

Terms	Description
Encapsulate:	Complete and total covering or surrounding of one material by another. The encapsulated material can be neither seen nor felt at the surface of the finished product. A mitigation technique that reduces or eliminates emissions from a source by sealing with an impenetrable barrier.
Endotoxin:	A biological agent that is part of the outer membrane of some bacteria. Endotoxins are highly toxic, capable of causing fever, malaise, respiratory distress, even death.
Energy Efficiency:	Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided. Such savings are generally achieved by substituting technically more advanced equipment to produce the same level of end-use services (e.g. lighting, heating, motor drive) with less electricity. Examples include high-efficiency appliances, efficient lighting programs, high-efficiency heating, ventilating and air conditioning (HVAC) systems or control modifications, efficient building design, advanced electric motor drives, and heat recovery systems.
Energy Efficiency Ratio (EER):	A ratio of the Cooling Capacity in Btu/h to the power input values in watts at any given set of rating conditions expressed in Btu/W•h. It applies to equipment exceeding 65,000 Btu/h capacities.
Energy Guide Label:	The Federal Trade Commission (FTC) requires that gas, electric and oil residential automatic storage water heaters be labeled to show: 1) an estimated annual cost of operation for that particular model, based on a national average cost of fuel specified by FTC, and 2) how the efficiency of that model compares to all other comparable models
Energy Management System:	A control system (often computerized) designed to regulate the energy consumption of a building by controlling the operation of energy consuming systems, such as the heating, ventilation and air conditioning (HVAC), lighting and water heating systems. Also termed as Building Automation Systems (BAS) or Building Management Systems (BMS).
Energy Recovery Ventilator (ERV):	This device preheats incoming outside air during the winter and pre-cools incoming air during the summer to reduce the impact of heating and or cooling the indoor air. This means that smaller capacity heating and cooling systems can be used in homes, which results in lower installation costs, lower peak demand for energy, and lower operating costs.
Energy Use:	A term referring to the total energy used by a system in the course of its operation. In the context of HVAC this would include energy used by components such as fans, refrigeration and heating equipment, cooling towers, and pumps.
Energy:	Broadly defined, is the capability of doing work.
Enthalpy:	A thermodynamic property of a substance defined as its internal energy. Formerly called "total heat" or "heat content". Enthalpy refers to the total value of sensible plus latent heat or energy. Unit of measurement is Btu/lb. In psychrometrics, it is expressed as Btu/lb. of moist air. Symbol: h.
Enthalpy Sensor:	Total heat sensor. A device for measuring the temperature and humidity of air. The higher the humidity at a given temperature, the greater the total heat of the air. The values of air temperature and the amount of water converted to BTUs are combined for the total heat content of the air.
Entrainment:	Air discharged from an outlet creates a swirling, jet, or other air motion that pulls (entrains) the surrounding air into its path where it mixes with the supply air. *(See also Secondary Air Motion).*
Envelope:	The geometrical surface of the points of an air jet, corresponding to a determined value of the measured air velocity. This velocity is generally called "terminal velocity". Also, the air barrier that separates the conditioned space from the outside and from unconditioned spaces like attics and garages.

Terms	Description
Environmental Agents:	Conditions other than indoor air contaminants that cause stress, comfort, and/or health problems (e.g., humidity extremes, drafts, lack of air circulation, noise, and over-crowding).
EPA:	Environmental Protection Agency (http://www.epa.gov). EPA is a federal agency, which administers federal environmental policies, enforces environmental laws and regulations, performs research, and provides information on environmental subjects.
EPA Refrigerant Rules:	Set of rules to reduce chlorine releases and protect ozone in the stratosphere. Proper use of refrigerant rules including no venting of refrigerants. Manufacturing phase-out of refrigerants containing chlorine has been completed in developed countries.
EPA Technician Certification:	Technicians are required to pass a test specific to the type of equipment they service. The test is about proper usage of refrigerants. The three classifications are Small Appliance, High-Pressure Systems, and Low-Pressure Systems. Sometimes known as the CFC test.
Epidemiological:	Dealing with the scientific study of the incidence, control, and spread of disease in a population.
Equivalent Direct Radiation (E.D.R.):	*See Square Foot of Heating Surface.*
Equivalent Length:	That length of straight tubing which has the same pressure drop as the fitting, valve or accessory (of the same nominal size) being considered.
Ergonomics:	The science that investigates the impact of people's physical environment on their health and comfort (e.g., chair design, monitor location, desk configuration or height, etc.)
ERV: (Energy Recovery Ventilator)	This device preheats incoming outside air during the winter and pre-cools incoming air during the summer to reduce the impact of heating and or cooling the indoor air. This means that smaller capacity heating and cooling systems can be used in homes, which results in lower installation costs, lower peak demand for energy, and lower operating costs.
Evaporative Cooler:	A type of cooling equipment that turns air into moist, cool air by saturating the air with water vapor. It does not cool air by use of a refrigeration unit. This type of equipment is commonly used in warm, dry climates.
Evaporative Cooling:	The cooling effect of vaporization of a liquid in a moving air stream.
Evaporator Approach Temperature:	The temperature difference between the evaporator¹s refrigerant temperature and the leaving chilled water temperature.
Evaporator Coil:	The part of a heat pump or air conditioning system that is located inside the house in the air handler. It is here that the refrigerant evaporates as it absorbs heat from the air that passes over the coil. The air leaving the coil is cooled and dehumidified at the apparatus dewpoint of roughly ~52°F. Also called the cooling coil or indoor coil.
Evaporator Superheat:	The actual temperature of the refrigerant vapor at the evaporator exit as compared to the saturated vapor temperature indicated by the suction pressure.
Evaporator:	A coil that absorbs heat in the air/water passing over it by evaporating refrigerant inside the piping.
Exfiltration:	The uncontrolled, unintentional, flow of inside air out of a building. This can occur through cracks in any building component, around openings that are not airtight, and during the everyday use of windows and doors. Like natural ventilation, infiltration is caused by differences in air-pressure or density between inside and outside. *(See also Infiltration).* Generally, exfiltration is considered desirable as long as it is not excessive, especially in contrast to infiltration.
Exhaust Air Flow Rate:	Volume of air leaving an exhaust air terminal device within a time unit.
Exhaust air:	The air extracted from a space and discharged to the outdoors. This is distinct from air extracted from one space and sent to another, or recirculated within the HVAC system.

Terms	Description
Exhaust air Ductwork:	The term "exhaust air ductwork" means all ductwork carrying air from a room, space, area, or equipment to a fan and then discharged to the outdoors. Exhaust air ductwork extends from the registers, grilles, equipment, or other exhaust openings to the fan and from the fan to the outdoor discharge point.
Exhaust Opening, or Inlet:	Any opening, a grille for example, through which air is removed from a space.
Exhaust Ventilation:	Mechanical removal of air from a portion of a building. Air removed deliberately from a space, by a fan or other means, usually to remove contaminants from a location near their source. The air flow leaving the treated space. Exhaust may be accomplished by one or more of the following methods: a) Extraction: exhaust in such a manner that the air is discharged into the atmosphere, b) Relief: exhaust in such a manner that the air is allowed to escape from the treated space if the pressure in that space rises above a specified level, c) Recirculation: exhaust in which the air is returned to the air treatment system, d) Transfer: exhaust in which air passes from the treated space to another treated space.
Expansion Device:	A thermal expansion valve (often abbreviated as TEV, TXV or TX valve) is a component in refrigeration and air conditioning systems that control the amount of refrigerant flow into the evaporator. A basic refrigeration cycle consists of four major elements, a compressor, a condenser, a metering device and an evaporator. A thermal expansion valve is a key element to a refrigeration cycle; the cycle that makes air conditioning, or air cooling, possible. As a refrigerant passes through a circuit containing these four elements, air conditioning occurs. The cycle starts when refrigerant enters the compressor in a low pressure, low temperature and gaseous form. The refrigerant is compressed by the compressor to a high pressure and temperature gaseous state. The high pressure and temperature gas then enters the condenser. The condenser precipitates the high pressure and temperature gas to a high temperature liquid by transferring heat to a lower temperature medium; usually ambient air. The high temperature liquid then enters the expansion valve where the TX valve allows a portion of the refrigerant to enter the evaporator. In order for the higher temperature fluid to cool, the flow must be limited into the evaporator to keep the pressure low and allow expansion back into the gas phase. Expansion valve reduces the pressure and temperature of the refrigerant and allows the regulated flow of the refrigerant to the evaporator. Thermal expansion valves are often referred to generically as "metering devices".
Expansion Tank:	A tank designed to absorb excess pressure due to thermal expansion, e.g. closed system.
External Static Pressure:	The sum of the static and velocity pressures of a moving air system at the point of measurement.
Exposed:	The term "exposed" means not concealed. Usually used in conjunction to the ductwork, pipe work or equipment without insulation or not placed in a concealed mechanical room.
Fahrenheit:	A temperature scale with the freezing point of water 32° F and the boiling point 212° F at sea level. To convert Fahrenheit to Celsius, the relation is C/5 = (F-32)/9; for example 77°F is equivalent to 25°C.
Fan:	A device that produces a pressure difference in air to move it.
Fan Cycling:	The use of a pressure control to turn a condenser fan on and off to maintain a correct pressure within the system.

Terms	Description
Fan Laws:	A family of mathematical relationships that allows the calculation of new operating characteristics from known system conditions.
Fan - Run Capacitor:	A small component that assists the fan motor in starting and running efficiently. Capacitors create a sort of "lead voltage" that helps to "draw" the motor along. Most fan motors will not run without one. They are small and usually made of a silver metal.
Fan Coil Unit (FCU):	An indoor component of a heat pump system used in place of a furnace to provide additional heating on cold days when the heat pump does not provide adequate heating. A component of a heating, ventilation and air conditioning (HVAC) system containing a fan and heating or cooling coil, used to distribute heated or cooled air.
Fan Relay:	A magnetic control relay located in the indoor unit that operates the fan for the indoor blower system.
Fan Terminal Unit:	A compartment containing an integral fan that delivers a constant volume of air to the space. These units are often used as part of a perimeter zone heating solution in open plan underfloor plenums. Room air from one or more controlled floor diffusers is ducted to the inlet of the unit, which in turn discharges the air through another set of ducted diffusers to the room. In this case, a heating coil is added to the discharge of the unit. *(See also Fan Coil Unit).*
Fan-powered Mixing Box:	A compartment containing an integral fan that mixes two air supplies before being discharged. In underfloor applications, these boxes may be configured as having one ducted inlet supplying room or return air, for example, to be mixed with plenum air entering the box through an un-ducted opening. A reheat coil can be added to the discharge of the unit.
Feet per Minute (FPM):	A term assigned to a velocity of a moving air stream, usually expressed as FPM. The main duct air velocity is generally 1500 to 2000 FPM and the cooling coil face area is calculated at 500 FPM velocity.
Fiberglass:	A fine amorphous, brittle, and usually transparent filament. A material made up of fine filaments.
Fibrous Duct:	The kind of duct that was most popular in the 1970's and 80's. This is square or rectangular, and must be "crafted" into shape. This type of duct exists in many homes today.
Filter:	A device for removing dust particles from air or unwanted elements from liquids.
Filter-Dryer:	A refrigeration piping component that will act not only as strainer for removing physical contaminates but will also remove water and in some applications, acid.
Fins:	Fins are thin strips of metal (usually aluminum) attached to tubing (usually copper) in air conditioning coils. There are approximately eight to fourteen fins or thin strips of metal per inch of tubing. They provide additional surface to absorb or reject heat.
Fire Dampers: (or Fire Valves)	Components which are installed in an air distribution system between two fire separating compartments and are designed to prevent propagation of fire and/or smoke. Generally are kept open by mechanical restraint whose effect is canceled under specific conditions. The valve is then closed automatically.
First Costs:	The initial costs involved in a building project, typically incurred during the construction and installation stages.
First Hour Delivery (Rating):	Combination of the usable stored volume of hot water in tank, plus the recovery capacity for the first hour of operation
Flame Roll-Out:	A dangerous situation that occurs when flame is pushed out of the bottom of a combustion appliance. It can lead to fires.
Flash Gas:	Instantaneous evaporation of some liquid refrigerant at the metering device due to pressure drop which cools the remaining liquid refrigerant to the desired evaporation temperature.

Terms	Description
Flex Duct:	A very efficient round flexible duct that is both pre-insulated and easy to work with in tight places. Air flow is better in round conduits, making flexible duct the natural choice. Usually installed in a single, continuous piece between the register and the plenum box. A flexible duct usually has an inner lining and an insulated coating on the outside.
Float Trap:	A steam trap which is operated by a float. When enough condensate has drained (by gravity) into the trap body, the float is lifted which in turn lifts the pin off its seat and permits the condensate to flow into the return until the float has been sufficiently lowered to close the port. Temperature does not effect the operation of a float trap.
Floor-to-Floor Height:	The vertical height between the finished-floor level of a space in a multi-story building and that of the floor immediately above or below it.
Flow Coefficient:	A dimensionless parameter relating air velocity to fan tip velocity. It is used to determine the approximate fan width for centrifugal impellers.
Flow Control Valve:	Device designed to reduce water flow (GPM) to a chilled water coil or a plumbing fixture (i.e. shower head at 5 GPM vs. 2.5 GPM). The use of flow control valves can be cost effective in load calculations, thereby reducing the water usage.
Flow Hood:	A diagnostic tool used to measure air flow through ducts, supply registers, and return grilles. Device that easily measures airflow quantity, typically up to 2,500 cfm.
Flow Rate:	Rating in gallons per minute (GPM) or gallons per hour (GPH).
Flue Baffle:	A device to deflect, check or regulate flow through the flue.
Flue Damper:	Minimizes convective heat loss through venting system.
Flue:	A passage way for products of combustion.
Foam Insulation:	The insulation surrounding the surface of the water heater tank.
Follow-Up Testing:	The testing designed to confirm the results of the initial testing using identical testing devices and similar test conditions.
Foot Print:	The area of space taken up by the water heater.
Forced Air Unit (FAU):	A central furnace equipped with a fan or blower that provides the primary means for circulation of air.
Forced Air:	This describes a type of heating system that uses a blower motor to move air through the furnace and into the ductwork.
Forced Ventilation:	A term used to describe the use of fans and intake/exhaust vents to mechanically distribute ventilation and other conditioned air throughout a building. Buildings operating forced ventilation systems are generally pressurized to reduce infiltration. This term is often contrasted with natural ventilation.
Formaldehyde:	Formaldehyde is a colorless water-soluble gas. Due to its wide use, it is frequently considered separately from other volatile organic compounds (VOCs).
Free Delivery:	No ducts are involved. The unit may be installed in the field without ducts if needed.
Freeze-Stat:	A thermostat used to keep something from freezing such as an evaporator coil or a water line. Often set at 35-37 degrees Fahrenheit.
Freezing Point:	The temperature at which the removal of any heat will begin a change of state from a liquid to a solid.
Freon:	A refrigerant trade name. A refrigerant manufactured by DuPont.
Frequency:	The number of cycles which an alternating current moves through in each second. Standard electric utility frequency in the United States is 60 cycles per second, or 60 Hertz.

Terms	Description
Functional Performance Testing:	The term "functional performance testing" typically means the full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the contract documents. In this context, *function* includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.
Fungi:	A large group of organisms including molds, mildews, yeasts, mushrooms, rusts, and smuts. Any of a group of parasitic lower plants that lack chlorophyll. Most fungi produce spores which are broadcast through the air so that virtually all environmental surfaces will have some fungal material. Most health effects are associated with allergic responses to antigenic material or toxic effects from mycotoxins. Fungi also generate certain volatile organic compounds.
Fungicide:	Substance or chemical that kills fungi.
Furnace, Horizontal:	A furnace that lies on its side, pulling in return air from one side and expelling warm air from the other.
Furnace:	That part of an environmental system which converts gas, oil, electricity or other fuel into heat for distribution within a structure.
Furnish:	The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations" as applicable to each instance.
Fusible Link:	A link of metal with a lower melting point than that of the heat strips. It is installed inside of the indoor unit and within inches of the actual heater coils. Should a fan shut down and the heaters continue to burn, the link will shut off the system when it burns through. It operates on the same principle of fire doors or dampers.
Gage:	An instrument for measuring pressure.
Galvanic Action:	If two unlike metals are immersed in an electrolyte, an electrical potential will exist between them. If the two are in electrical contact, an electrical current will flow. The metal which becomes the anode of this cell will corrode and dissolve while the cathode will be protected from corrosion.
Gas Control:	Device use to regulate gas pressure on a water heater
Gas Sorption:	Devices used to reduce levels of airborne gaseous compounds by passing the air through materials that extract the airborne gases.
Gate Valve	A gate valve is a valve that opens by lifting a round or rectangular gate out of the path of the fluid. Gate valves are sometimes used for regulating flow, but many are not suited for that purpose since they were designed to be fully opened or closed. When fully open, the typical gate valve has no obstruction in the flow path resulting in very low friction loss. Essentially an 'ON-OFF' valve.
Gauge Pressure:	Pressure measured with atmospheric pressure as a base.
Geothermal Energy:	Natural heat from within the earth; captured for production of electric power, space heating or industrial steam.
Geothermal Equipment:	Heat pumps that use the ground to transfer heat to and from the refrigerant in the unit. The unit circulates water through a heat exchanger into a closed loop buried in the ground or by pumping water from a well through the unit.
Geothermal Gradient:	The change in the earth's temperature with depth. As one goes deeper, the earth becomes hotter.
Global Climate Change:	Gradual changing of global climates due to buildup of carbon dioxide and other greenhouse gases in the earth's atmosphere. Carbon dioxide produced by burning fossil fuels has reached levels greater than what can be absorbed by green plants and the seas.

Terms	Description
Global Warming:	Global warming is the gradual increase in global temperatures caused by the emission of gases that trap the sun's heat in the Earth's atmosphere. Gases that contribute to global warming include carbon dioxide, methane, nitrous oxides, chlorofluorocarbons (CFCs), and halocarbons (the replacements for CFCs). The carbon dioxide emissions are primarily caused by the use of fossil fuels for energy.
Globe Valve:	A globe valve is used for regulating flow or throttling applications where fine adjustments are required in controlling the rate of flow.
GPH:	Gallons Per Hour. You might see this rating if you are looking at an oil furnace or water pump sizing chart. In addition to input and output, an oil furnace also has a rating of gallons per hour (the volume of oil a furnace is capable of burning in 60 minutes). Most water pumps are sized in GPH.
Grain(s):	A unit of weight. One grain is equivalent to 1/7000 of a pound. By comparison, one gram is equivalent to 1/453.6 of a pound. In psychrometric work, the unit of grain(s) is used in the expression of humidity where it expresses the ratio of weight of moisture per pound of dry air; e.g. 70 GPP: Humidity Ratio (W) = (70 / 7000) = 0.010. Symbol: GPP (Grains Per Pound) of dry air.
Greenhouse Effect:	The presence of trace atmospheric gases make the earth warmer than would direct sunlight alone. These gases (carbon dioxide [CO_2], methane [CH_4], nitrous oxide [N_2O], troposphere ozone [O_3], water vapor [H_2O], and chlorofluorocarbons) allow visible light and ultraviolet light (shortwave radiation) to pass through the atmosphere and heat the earth's surface. This heat is re-radiated from the earth in the form of infrared energy (long-wave radiation). The greenhouse gases absorb part of that energy before it escapes into space. Thus the greenhouse effect allows solar radiation to penetrate but absorbs the infrared radiation returning to space. This process of trapping the long wave radiation specifically is known as the greenhouse effect. Scientists estimate that without the greenhouse effect, the earth's surface would be roughly 54°F colder than it is today.
Greenhouse Effect: (Relating to Buildings)	The characteristic tendency of some transparent materials (such as glass) to transmit radiation with relatively short wavelengths (such as sunlight) and block radiation of longer wavelengths (such as heat). This tendency leads to a heat build-up within the space enclosed by such a material.
Grille:	A perforated or louvered covering on any area that air passes through. Grilles can be placed in the ceiling, floor or wall and can be fixed, or adjustable.
Ground Water-Source:	Water from an underground well is being used as the heat source or heat sink for a heat pump.
Grounded:	The "power leg" or "hot" wire is connected to ground. This is usually expressed when the motor winding burns on the inside of the compressor, falling over against the casing. Every time the power is turned on, the breaker trips as the electricity is going directly to "ground".
Ground-Source:	The ground or soil below the frost line is being used as the heat source or heat sink for a heat pump.
Half-Life: Hard Start	The amount of time it takes for half of the existing amount of a radioactive element to decay to non-radioactive products.
Kit:	Basically a compressor start-capacitor, pre-packaged for quick use when a troublesome compressor won't start. If a compressor still won't start after a Hard Start Kit is installed, you may need a new compressor. Serves the same purpose as start-capacitor.
Hard Water: HCFC:	Natural waters contain impurities in various proportions; traditionally hardness is a measure of calcium or dissolved solids in a solution.
(Hydro-chlorofluorocarbon)	A class of refrigerants. Refers to the Halogenated Chlorofluorocarbon family of refrigerants. The most common is R-22. It can be manufactured till the year 2030. Equipment manufactured after 2015 will no longer have R-22 in them.

Terms	Description
HDD - Heating Degree Days:	Quantitative indices designed to reflect the demand for energy needed to heat a home or business. These indices are derived from daily temperature observations, and the heating requirements for a given structure at a specific location are considered to be directly proportional to the number of HDD at that location. A similar index, cooling degree day' (CDD), reflects the amount of energy used to cool a home or business. HDD are defined relative to a base temperature; the outside temperature above which a building needs no heating. HDD are often made available with base temperatures of 65°F (18°C), or 60°F (15.5°C). One popular approximation method is to take the average temperature on any given day and subtract it from the base temperature. If the value is less than or equal to zero, that day has zero HDD. But if the value is positive, that number represents the number of HDD on that day.
Head Loss:	The pressure of water as measured at a stated point; it may be measured in feet or in pounds per square inch (PSI)
Heat Balance:	The outdoor temperature at which a building's internal heat gain (from people, lights and machines) is equal to the heat loss through windows, roof and walls.
Heat Capacity:	The amount of heat necessary to raise the temperature of a given mass one degree. Heat capacity may be calculated by multiplying the mass by the specific heat.
Heat Engine:	An engine that converts heat to mechanical energy.
Heat Exchanger:	A device used to transfer heat from a fluid (liquid or gas) to another fluid, where the two fluids are physically separated (usually by metal tubing). Household examples of heat exchangers are heating radiators and the coils on your refrigerator and room air conditioner.
Heat Flow:	Heat flows from a warmer to a cooler substance. The rate depends upon the temperature difference, the area exposed and the type of material.
Heat Gain:	The amount of heat gained, measured in BTU's, from a space to be conditioned at the local summer outdoor design temperature and a specified indoor design condition.
Heat Loss:	The amount of heat lost, measured in BTU's, from a space to be conditioned at the local winter outdoor design temperature and a specified indoor design condition. The amount of heat lost from a structure through crack, crevices, fans, unused chimneys etc. Heat loss can be reduced by insulating, installing energy efficient windows and doors, weather-stripping and caulking.
Heat of Compression:	The heat added to a vapor by the work done on it during compression.
Heat of the Liquid:	The increase in total heat (Enthalpy) per pound of a saturated liquid as its temperature is increased above a chosen base temperature. (Usually 400°F for refrigerants). It is expressed in BTU's.
Heat of Vaporization:	The heat (energy) required for a substance to change phase from liquid to vapor. Expressed as Btu/lb. The heat of vaporization is referenced to pressure and temperature. For many air conditioning calculations (70°F at 50% RH) the value of 1076 Btu/lb is used for the heat of vaporization. At saturation (100% RH) and 70°F, a value of 1112 Btu/lb is taken correct.
Heat pipes:	It is a pipe with a refrigerant inside for passive refrigerant heat transfer. Energy recovery device for transferring energy and used in applications for tempering intake air.
Heat Pump Cooling Mode:	In the cooling cycle of a Heat Pump, you are removing hot air from inside the house and sending it outside. You can feel the hot air outside over the condenser fan motor.
Heat Pump Heating Mode:	In the heating mode of a Heat Pump, the refrigerant cycle is reversed and you are now removing the heat from the outside and sending it inside the house. You can feel the cool air outside over the condenser fan motor. When temperatures go below 40°F, heat pumps labor in producing heat and must use backup electric heat strips.

Terms	Description
Heat Pump:	A heat pump is a DX type air conditioner with a valve that allows it to operate in reverse; removing heat from your house and transferring it outdoors in the summer, and removing heat from outdoor air and transferring it into your house in the winter. Because heat pumps do not actually create heat — they just move it from one place to another — heat pumps can be more efficient than other forms of heating.
Heat Rate:	A number that indicates how efficient a fuel-burning power plant is. The heat rate equals the Btu content of the fuel input divided by the kilowatt; hours of power output.
Heat Recovery Ventilator (HRV):	This device brings fresh outside air into a home while simultaneously exhausting stale indoor air outside. In the process of doing this, an HRV removes heat from the exhaust air and transfers it to the incoming air; pre-heating it. This allows for the reclamation of much of the energy that otherwise would simply be vented outside.
Heating Seasonal Performance Factor (HSPF):	The total heating output of a heat pump, including supplementary electric heat necessary to achieve building heating requirements during its normal annual usage period for heating divided by the total electric power during the same period. Expressed in Btu/ [W.h].
Heat Sequencer:	A time oriented magnetic relay that controls the stages of electric heat strips. Located in the air handler/indoor unit control box, these come in several shapes and sizes but they all perform the same function. Stage on and off heat and the fan in heating.
Heat Source:	A body of air or liquid from which heat is collected. In an air source heat pump, the air outside the house is used as the heat source during the heating cycle.
Heat Strip:	Cupronickel spun wire with low resistance, used for heating coils. You have seen them in everything from space heaters to hair dryers.
Heat Transfer:	The flow of heat from one substance to another, for instance, the flow of heat from your water heating element to the water that surrounds it. The three methods of heat transfer are conduction, convection and radiation.
Heat Trap:	Restricts heat loss through water connections to a tank
Heat/cool Anticipator:	Two small resistors that create heat in the wall thermostat. These small heaters are there to "fake out" the thermostat and compensate for the weight of the mercury in the bulb.
Heat:	A form of energy causing the agitation of molecules within a substance. Heat always flows from a body of higher temperature to a body of lower temperature. *(See also Latent Heat, Sensible Heat, Specific Heat, Total Heat and Heat of the Liquid).*
Heating Capacity:	A measure of the ability of a unit to add heat to an enclosed space.
Heating Degree Day:	A unit that measures the space heating needs during a given period of time.
Heating Load:	The rate at which heat must be added to a space in order to maintain the desired temperature within the space.
Heating Medium:	A substance such as water, steam, or air used to convey heat from the boiler, furnace or other source of heat to the heating units from which the heat is dissipated.
Heating Seasonal Performance Factor (HSPF):	The total heating output of a heat pump in Btu during its normal usage period for heating divided by the total electrical energy input in watt-hours during the same period.
Heating Surface:	The exterior surface of a heating unit.
Heating System:	Energy Efficiency program promotion aimed at improving the efficiency of the heating delivery system (including replacement) in the residential, commercial, or industrial sectors.
Heating Unit:	Radiators, convectors, base boards, finned tubing, coils embedded in floor, wall, or ceiling, or any device which transmits the heat from the heating system to the room and its occupants.

Terms	Description
HEPA:	High Efficiency Particulate Arrestance (filters).
Herein:	The term “herein” shall mean the contents of a particular section where this term appears.
Hermetic Sealed:	Assembly of a motor and compressor inside a single fully enclosed housing unit.
Hertz:	A unit of electromagnetic wave frequency that is equal to one cycle per second.
HFC: (Hydrofluorocarbon)	Refrigerant containing no chlorine. An example is 134a, a replacement for R-12.
High -Efficiency Furnace:	The high-efficiency furnace is a "condensing" furnace which means that the chimney gases, including steam, are cooled from about 350°F to about 100°F. This makes the steam condense back into water, allowing more heat to be recovered and less to escape into the outside environment.
High Pressure Switch:	A pressure operated switch that reacts to a maximum pressure setting. Most high pressure switches are located in the outdoor unit and open at 425 psi. Too high a pressure in a system can damage coils and components. The most common reasons for a high pressure cutout are dirty condenser coils and failed outdoor fan motors.
High-Efficiency Particulate Air (HEPA) Filter:	A specialized filter capable of removing 99.97% of particulates 0.3 µ in diameter. High efficiency particulate arrestance (filters).
Home Energy Assistance Program: (HEAP)	A centrally operated direct payment program that assists eligible households in offsetting the cost of heating and cooling their homes. Payments are generally made in the form of dual party warrants (checks) made payable to the applicant and their designated utility company. For example, the program is administered in California by the California Department of Economic Opportunity using federal and state funds.
Horsepower:	A unit to indicate the time rate of doing work equal to 550 ft.-lb. per second, or 33,000 ft.-lb. per minute. One horsepower equals 2,545 Btu per hour or 746 watts.
Hot Water Heating Systems:	A heating system in which water is used as the medium by which heat is carried through pipes from the boiler to the heating units.
House Dust Mite:	A common microscopic household arachnid which feeds on shed skin scales and tends to concentrate around mattresses and furniture. Antigens present in the mite's excreta are implicated in cases of allergic asthma and allergic rhinitis.
Housewrap:	Housewrap is a sheet of plastic, often fiber-reinforced, that is used to reduce air leakage in new homes. These sheets are wrapped around the outside of a house during construction. Builders must seal the housewrap at all joints and seams to create a truly continuous and effective air retarder.
HRV: (Heat Recovery Ventilator)	An HRV is a device that brings fresh outside air into the enclosed space while simultaneously exhausting stale indoor air outside. In the process of doing this, an HRV removes heat from the exhaust air and transfers it to the incoming air and pre-heating it. This allows for the reclamation of much of the energy that otherwise would simply be vented outside.
HSPF or HSPR:	Heating Seasonal Performance Factor or Rating means the total heating output of a heat pump in Btus during its normal usage period for heating divided by the total electrical energy input in watt-hours during the same period. Heating seasonal performance factor is similar to SEER but it measures the efficiency of the heating portion of a heat pump. Like SEER, industry minimums have been raised recently and the minimum is now 6.80 HSPF.
H-Trac:	A method of dehumidifier capacity control which assures a constant relative humidity value at the point of measurement (return air, supply air, room/space) in conjunction with a desiccant based dehumidifier.
Humidification:	Adding water (vapor or atomization) to the conditioned space.

Terms	Description
Humidifier Fever:	A respiratory illness caused by exposure to toxins from microorganisms found in wet or moist areas in humidifiers and air conditioners.
Humidifier:	A device that adds moisture to warm air being circulated or directed into a space. This adds necessary moisture to protect furnishings and reduce static electricity.
Humidistat:	A device designed to regulate humidity input by reacting to changes in the moisture content of the air. Much like a thermostat, it turns the system on and off by sensing the humidity level.
Humidity:	Water vapor contained in air. Expressed as specific, relative, or absolute humidity. Common units of measure are: percent relative humidity (RH), partial vapor pressure, grains of moisture per pound of dry air (GPP), dew point or humidity ratio (W). The amount of vapor that air can hold is a function of the air temperature. Air conditioners remove moisture for added comfort.
HVAC:	Heating, ventilation, and air conditioning
HVAC System:	A heating ventilation and air conditioning (HVAC) system is one that conditions the indoor air. HVAC system design primary covers four elements 1) Cooling or Heating 2) Humidity Control 3) Filtration and 4) Air Distribution.
HVAC/R:	Heating, Ventilating, Air Conditioning, & Refrigeration
Hydronic Heating:	A system that heats a space using hot water which may be circulated through a convection or fan coil system or through a radiant baseboard or floor system.
Hygroscopic:	Descriptive of a substance that has the property of adsorbing or absorbing moisture from air. The water vapor molecules are held by or bound within the molecules of the hygroscopic material. Desiccants are hygroscopic materials, e.g. silica gel, molecular sieve, lithium chloride or calcium chloride.
Hypersensitivity Diseases:	Diseases characterized by allergic responses to pollutants. The diseases most clearly associated with indoor air quality are asthma, rhinitis, and hypersensitivity pneumonitis.
IAQ:	Indoor Air Quality - characteristics of the indoor climate of a building, including the gaseous composition, temperature, relative humidity, and airborne contaminant levels. Providing a sufficient quantity of conditioned air that is comfortable and healthy. Maintaining a positive pressure in the building so that the building exfiltrates or leaks out instead of in. Exhausting a sufficient quantity of air to remove contaminants.
IAQ Backgrounder:	A component of the IAQ Tools for Schools Action Packet that provides a general introduction to IAQ issues in educational facilities.
IAQ Checklist:	A component of the IAQ Tools for Schools Kit containing easy-to-do activities for school staff to improve or maintain good indoor air quality.
IAQ Coordinator:	An individual (usually with facility management) who provides leadership and coordination of all IAQ activities.
IAQ Management Plan:	A set of flexible and specific steps for preventing and resolving IAQ problems in any kind of commercial facility.
IAQ TEAM:	People who have a direct impact on IAQ in the schools who implement the IAQ Action Packets.
Ice Bank:	A form of EMS that makes and stores ice at night while electric rates are lower and uses the ice to chill water that is used to cool the building in the day. There are several ways this saves. First you are cooling with cheaper electricity, and second, you can use a smaller cooling unit (Less tonnage).
Immersion:	Referring to something submerged in water.
Impeller:	The component of a fan assembly that is composed of a number of contoured blades.

Terms	Description
Impregnate:	A process by which one material is permeated by another substance or material. Frequently, binders are also used to retain a material or substance in the impregnated material or substance.
Inches of Water Gage (in-wg):	A unit of air pressure measurement equal to the pressure exerted by a column of water 1 inch high.
Inches of Mercury:	Unit specifying pressure. Atmospheric pressure is equal to 29.92 inches of mercury.
Including:	The term “including” is typically taken in the most inclusive sense, namely “including, but not limited to” and “such as, but not limited to.”
Incoming (Inlet) Temperature:	Temperature of water entering the tank
Indicated:	The term “indicated” is a cross-reference to graphic representations, details, notes, or schedules on the drawings; to other paragraphs or schedules in the specifications; and to similar means of recording requirements in the Contract Documents.
Indicator Compounds:	Chemical compounds, such as carbon dioxide, whose presence at certain concentrations may be used to estimate certain building conditions (e.g., airflow, presence of sources).
Indoor:	The term “indoor” means items or devices contained within the confines of a building, structure, or facility and items or devices which are not exposed to weather. The term “indoor” shall generally reference ductwork, piping, or equipment location (indoor ductwork, indoor piping, indoor equipment).
Indoor Air Pollutant:	Particles and dust, fibers, mists, bio-aerosols, gases or vapors.
Indoor Air Quality (IAQ):	This term generally refers to quantifiable properties of the respiratory air inside a building. Providing a sufficient rate of ventilation to exhaust heat, moisture and pollutants generated inside a building is a key component of meeting IAQ standards (ASHRAE Standard 62), which provides designers with guidelines for achieving acceptable ventilation rates and indoor air quality.
Indoor Coils:	An air-cooled heat exchanger placed indoors for cooling the indoor air. It is typically made of several rows of copper tubing with aluminum fins. The refrigerant, after exchanging heat with air, becomes vapor and is compressed and condensed for heat rejection. *(See also Evaporator Coil).*
Indoor Unit:	That unit within the home, which delivers the air throughout the duct system to the various rooms. It houses a high speed blower, cooling coil, and filter system. It is either located in a hallway closet or the garage.
Induction Ratio:	Ratio of the total air flow rate to the primary air flow rate.
Induction:	Process by which the primary air sets into motion an air volume, called secondary air, in the room.
Infiltration:	The uncontrolled and unintentional flow of outdoor air into a building. This can occur through cracks in any building component, around openings that are not air-tight, and during the everyday use of windows and doors. Like natural ventilation, infiltration is caused by differences in air-pressure or density between inside and outside. *(See also Exfiltration).*
Infrared Cameras:	The infrared camera "sees" the heat and can show "hot spots" where a lot of heat is being lost. This helps to identify the places where the home's energy efficiency can be improved.
Input:	The amount of fuel used by a gas appliance in a given period of time; generally rated in 1 hour
Install:	The term “install” is used to describe operations at the project site including actual “unloading, unpacking, assembly, erection, placing, anchoring, connecting, applying, working to dimension, finishing, curing, protecting, testing to demonstrate satisfactory operation, cleaning and similar operations” as applicable in each instance.
Instantaneous Water Heater:	A type of water heater that heats water as it flows through a heat exchanger coil
Insulation:	Any material that slows down the transfer of heat.

Terms	Description
Integrated Building Systems:	Functional systems designed specifically to fit and work together as a larger system; intended to provide better performance than systems not designed for integration.
Integrated Energy Efficiency Ratio (IEER):	A single number that is a cooling part-load efficiency figure of merit.
Interior Zone:	Spaces located further than 5 m (15 ft) from the façade, which can be either high-occupancy (accommodating a number of work spaces) or low-occupancy (circulation or general meeting areas for example). Spaces within this zone are not directly affected by loads generated by the building envelope, such as solar heat gain or heat loss.
Internal Overload:	A thermally operated, bi-metal disc imbedded in the motor winding of the compressor. When temperatures run too high, this overload trips, shutting down the compressor. Once cooled the overload will automatically reset.
ISO 9000:	A family of international standards for quality management and assurance by the ISO (International Standards Organization).
Isothermal:	Of constant temperature (e.g., an isothermal air jet has the same temperature as the surrounding air).
IWC:	Inches of water column.
Joule:	A unit of work or energy. It takes ~ 1,000 joules to equal a British thermal unit (BTU).
Junction Box:	Utility area where incoming current is connected to a water heater.
K- Factor:	The insulating value of any material. Also known as conductivity.
Kilovolt: (kv)	One-thousand (1,000) volts. Distribution lines in residential areas usually are 12 kv (12,000 volts).
Kilowatt (kW):	A kilowatt equals 1,000 Watts or 3,412 Btus per hour.
Kilowatt-hour (kWh):	A kilowatt hour (kWh) is the amount of kilowatts of electricity used in one hour of operation of any equipment. A common unit of electrical consumption on which electrical billing is computed.
Latent Cooling Load: (or Latent Load)	The cooling load caused by moisture in the air. The net amount of moisture added to the inside air by plants, people, cooking, infiltration, and any other moisture source. The amount of moisture in the air can be calculated from a combination of dry-bulb and wet-bulb temperature measurements.
Latent Heat:	The heat energy needed to change the state of a substance (i.e.: from a liquid to a gas) but not it's temperature.
Legionella:	Legionella pneumophilia is a bacterium that causes lung infection and a disease called Legionellosis. People get legionellosis when they inhale water mist containing the bacteria. Within the context of HVAC systems, the most common location for the proliferation and amplification of Legionella is the cooling tower. The other locations include humidifiers, drain pans and other sources where standing water may accumulate. In the normal operation of a cooling tower, a number of conditions exist that are conducive to the survival and transport of the bacteria: • A standing pool of water. • Water temperature that is satisfactory to support bacteria growth. The bacteria typically proliferate between 68 degrees Fahrenheit and 113 degrees Fahrenheit with significant growth occurring between 95 degrees Fahrenheit and 110 degrees Fahrenheit. • Dirt and other particulate matter easily enter the open water system. These can provide nutrients for the Legionella Pneumophila. • Water mist is generated, allowing the bacteria to become airborne. In fact, Legionella Pneumophila is present in the water samples of nearly

Terms	Description
	all cooling towers. However, the levels of bacteria found in most cases are below those that would typically cause human health effects. So, while the mere presence of the bacteria is not cause for alarm, control of its levels is critical in minimizing the potential for detrimental health effects. Such control can be accomplished through the diligent design of the HVAC system and the administration of an appropriate maintenance program including proper water treatment. When designing an HVAC system, the air cooled condensers eliminates the risk of Legionella and do not need statutory permit from the health and safety agencies.
Life Cycle:	The sequence of events in planning, design, construction, use, and abandonment or disposal (e.g., through sale, demolition, substantial renovation) during the economic or service life of a facility; may include changes in use and reconstruction.
Life Extension:	A term used to describe capital expenses which reduce operating and maintenance costs associated with continued operation of electric utility boilers and other equipment. Such boilers usually have a 40-year operating life under normal circumstances.
Life-Cycle Cost:	The *present value* of all anticipated costs to be incurred during a facility's *economic life*; the sum of direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span.
Lift:	To elevate a fluid from one level to a higher level.
Liquid Line:	A tube used to convey the liquid refrigerant from the condenser outlet to the refrigerant control device of the evaporator.
Load Estimate:	A series of studies performed to determine the heating or cooling requirements of the enclosed space. An energy load analysis uses information such as the square footage of the space, window and door areas, insulation quality and local climate to determine the heating and cooling capacity needed by a furnace, heat pump or air conditioner. When referring to heating, this is often known as a Heat Loss Analysis.
Load:	The amount of electric power supplied to meet one or more end user's needs. The amount of electric power delivered or required at any specific point or points on a system. The requirement originates at the energy consuming equipment of the consumers.
Local Exhaust Ventilation:	An industrial ventilation system that captures and removes contaminants emitted from nearby sources before dilution into ambient workplace air can occur.
Locked up:	A type of mechanical failure. Metal parts are seized on metal parts and bound up. Sometimes they cannot be broken loose and a compressor is said to be "locked up". Each compressor has a certain amount of amperage that it draws when "locks up" making it easy to diagnose.
Low Pressure Switch:	This switch works exactly the same as the high pressure switch but in reverse. A low pressure switch is also generally located in the outdoor unit, which protects the compressor from low Freon conditions that result in low pressure and eventually cut out of the unit.
LP:	Liquid Propane - A fuel for gas water heaters.
Make-Up Air:	Air that is brought into the building by a fan system to replace air that is exhausted by a process like a kitchen exhaust hood or a lab hood. In some instances, it is simply included in the minimum outdoor air setting of the fan system serving the area. In other instances, it is addressed by a separate system dedicated to the function. The latter approach has the advantage of allowing operating economy to be achieved because the make up and exhaust processes can be cycled based on the function they serve independently from the comfort conditioning HVAC processes in the area. This is especially common in the case of kitchen hoods. *(See also Outdoor Air Supply).*

Terms	Description
MAU - Makeup Air Unit:	An air handler that conditions 100% outside air. MAUs are typically used in industrial or commercial settings, or in "once-through" (blower sections that only blow air one-way into the building), "low flow" (air handling systems that blow air at a low flow rate), or "primary-secondary" (air handling systems that have an air handler or rooftop unit connected to an add-on makeup unit or hood) commercial HVAC systems.
Manifolded Installation:	Paralleling of water heaters for large hot water demand applications.
Man-Made Mineral Fibers: (MMMF)	Fiber insulation products including glass wool, fiberglass, rock wool, slag wools, as well as refractory ceramic fibers which are used for fireproofing.
Manometer:	An instrument that measures air pressure differences between locations. Tubes are usually attached to a manometer and run to the spaces where pressures are measured.
Manual D:	Manual D is the Air Conditioning Contractors of America (ACCA) method for designing duct systems. Designing a duct system is essential for proper equipment performance and customer comfort.
Manual J:	Manual J is a widely accepted method of calculating the sensible and latent cooling (and heating) loads under design conditions. It was jointly developed by the ACCA and the Air-Conditioning and Refrigeration Institute (ARI).
Manual S:	Manual S is the ACCA method of selecting air conditioning equipment to meet the design loads. It ensures that both the sensible capacity and the latent capacity of the selected equipment will be adequate to meet the cooling load.
Manual reset:	A control that senses a condition such as temperature or pressure. Once the condition reaches a predetermined point that is considered dangerous, the control locks out the system. To restart the system, someone needs to reset the control. *(See also Automatic Reset).*
Mastic:	An adhesive paste used in the fabrication and sealing of thermal insulation on piping fittings, equipment and duct work. It spreads easily and dries permanently.
Matched System:	A heating and cooling system comprised of products that have been certified to perform at promised comfort and efficiency levels when used together and used according to design and engineering specifications.
Material Safety Data Sheets: (MSDS)	Product safety information sheets prepared by manufacturers and marketers of products containing toxic chemicals. This MSDS documentation is desired as a part of safety review and OSHA guidance.
Matrix:	A structure or configuration of a material which gives shape to the finished product and in which another material or structure develops, takes shape, or is contained.
May:	The word “May” in contracts indicate action which is permissible on the part of the Contractor.
MBH:	One MBH is equivalent to 1,000 BTU's per hour.
Mean Temperature Differences:	The mean of the difference between the temperature of a fluid receiving heat and a fluid yielding heat.
Mean Radiant Temperature (MRT):	The average temperature of all surrounding surfaces. Comfort is not just air temperature; the radiant temperature of surfaces around you, air velocity, relative humidity, activity and clothing all make a big difference. You can be comfortable in a 78 °F room if some surfaces are 65 °F.
Mechanical Ventilation:	A term used to describe the use of fans and intake/exhaust vents to mechanically distribute ventilation and other conditioned air throughout a building. Buildings operating mechanical ventilation systems are generally pressurized to reduce infiltration. This term is often contrasted with natural ventilation.
Mechanically Ventilated Crawlspace System:	A system designed to increase ventilation within a crawlspace to achieve higher or lower air pressure in the crawlspace relative to air pressure in the living spaces, by use of a fan.
Megawatt: (MW)	One thousand kilowatts (1,000 kW) or one million (1,000,000) watts.

Terms	Description
Melting Point:	The temperature at which the addition of any heat will begin a change of state from a solid to a liquid.
Mercury Manometer:	Used to measure vacuum in inches of mercury.
MET Units: (Metabolic Rate)	Metabolic Rate. HVAC requirements differ depending on how a building is used. Most comfort standards use a Met rate around 1.2
MHPU: (Mobile Home Package Unit)	The Mobile Home Package Unit is an air-conditioner with electric or gas heat or can be a Heat Pump. This unit has the condenser and air-handler all-in-one package. Commonly used in mobile homes and placed outside. (Self-contained unit)
Micron:	A unit used to measure high vacuums. One micron equals 1/25,400 of one inch mercury. Unit of length. A micrometer is one millionth (10^{-6}) of a meter or 10,000 Angstroms.
Mildew:	A superficial covering of organic surfaces with fungi under damp conditions.
Minimum Outdoor Air:	The outdoor air that must be brought into the system to handle the ventilation requirements of the building. This amount may vary with building use and the system operating conditions (either intentionally or unintentionally) or may be fixed any time the system is in operation (again, either intentionally or unintentionally). Maintaining the proper minimum outdoor air quantity is crucial in terms of ensuring proper indoor air quality, proper inter-space pressure relationships, and proper building pressurization. It is directly related to meeting code enforced ventilation requirements and may include make up air associated with various processes like kitchen hoods and lab hoods.
Mitigation:	A procedure or strategy aimed at reducing or eliminating an indoor air problem either through source control, ventilation control, exposure reduction or air cleaning.
Mixed Air Ductwork:	The term “mixed air ductwork” means all ductwork carrying a mixture of return air and outdoor air. Mixed air ductwork extends from the point of connection of the return air and outdoor air ductwork to the fan or air handling unit.
Mixing Ratio:	Is often used in drying applications and is the ratio of the mass of water vapor to the mass of dry air with which it is associated.
Mixing Systems:	In mixing systems (also known as mixing-type air distribution) conditioned air is delivered to the space at velocities much greater than those acceptable to occupants. Conventional overhead air distribution is an example of a mixing system. Supply air temperature may be above, lower, or equal to the air temperature in the occupied zone. The incoming high-velocity air mixes rapidly with the room air by entrainment so that by the time it enters the occupied zone its temperature and velocity are within an acceptable range. Mixing systems are designed to maintain the entire volume of air in the space (floor-to-ceiling) at a relatively uniform temperature, humidity, and air quality condition.
Mixing Valve:	Mixes hot and cold water to achieve a specified delivery temperature.
Model Building Codes:	The building codes published and adopted by state or other jurisdictions to control local construction activity.
Model Code Organizations:	Includes the following agencies and the model building codes they promulgate: Building Officials and Code Administrators International, Inc. (BOCA National Building Code/1993 and BOCA National Mechanical Code/1993); International Conference of Building Officials (Uniform Building Code/1991 and Uniform Mechanical Code/1991); Southern Building Code Congress, International, Inc. (Standard Building Code/1991 and Standard Mechanical Code/1991); Council of American Building Officials (CABO One- and Two-Family Dwelling Code/1992 and CABO Model Energy Code/1993).

Terms	Description
Modularity:	The separation of major user areas (in a building) into zones served by independent mechanical and electrical components; also a characteristic of integrated building systems, in which repetitive use of components and subsystems facilitates facility maintenance and repair.
Moisture Removal Capacity (MRC):	A measure of the capacity of a dehumidifier expressed in lbs per hour of moisture removal. Equation: MRC = (CFM * (60 min/hr / Vs) * (GPP_{in} - GPP_{out})) / 7000 grains/lb. Where, CFM is the volumetric rate of air, Vs is the specific volume of air expressed as ft^3/lb and GPP is grains of moisture per pound of dry air. GPPin - GPPout represents the grain "depression" or removal across the dehumidifier.
Mold:	A fungal infestation that causes disintegration of a substance. Molds are a group of organisms that belong to the family Fungi. There are over 20,000 species of mold.
Molecular Sieve:	A group of synthetic adsorptive desiccants which are crystalline aluminosilicate materials, chemically similar to a class of minerals known as zeolite. The outstanding characteristic of these materials is their ability to undergo dehydration with little or no change in crystal structure.
Motor:	A device that converts electrical energy into mechanical energy. A motor can operate on direct current (DC) or alternating current (AC) voltage supply, not both.
MRT – Mean Radiant Temperature:	The average temperature of all surrounding surfaces. (Comfort is not just air temperature). The radiant temperature of surfaces around you, air velocity, relative humidity, activity and clothing all make a big difference. You can be comfortable in a 78 °F room if some surfaces are 65 °F.
Muffler:	Device installed in hot gas line to silence discharge surges.
Morning warm up:	Reheating the building or space before it is occupied. In the winter when you “set back” your thermostat to conserve energy at night, there is a need to warm up the building before it is occupied. During this time period called “Morning warm up” you do not bring in outside air thus saving energy.
mVOC:	Microbial volatile organic compound, a chemical made by a mold which may have a moldy or musty odor.
National Ambient Air Quality Standard: (NAAQS)	The US outdoor air quality standard designed to protect public health. Pollutants covered by the NAAQS include ozone, sulfur dioxide, lead, nitrogen dioxide, respiratory particulates, and carbon monoxide.
National Institute for Occupational Safety and Health: (NIOSH)	The US government agency authorized to research and develop exposure criteria for toxic substances, and recommend these standards to OSHA. NIOSH is also authorized to investigate unsafe working conditions.
Natural Gas:	A fuel used with gas water heaters.
Natural ventilation:	When air moves into and out of a building through intentional or planned routes, without the assistance of mechanical equipment, this is termed natural ventilation. Generally driven by pressure differences, inlets and outlets include windows, doors, grilles, roof-openings and other designed apertures. This is often contrasted with forced or mechanical ventilation.
Negative Ion Generator:	An air cleaning device that uses static charges to remove particulates from indoor air.
Negative Pressure:	Condition that exists when less air is supplied to a space than is exhausted from the space, so the air pressure within that space is less than that in surrounding areas. Under this condition, if an opening exists, air will flow from surrounding areas into the negatively pressurized space.
NESHAP:	National Emissions Standard for Hazardous Pollutants
Net Present Value:	The sum of the present values of all costs and monetary-valued benefits of a facility over its economic life.

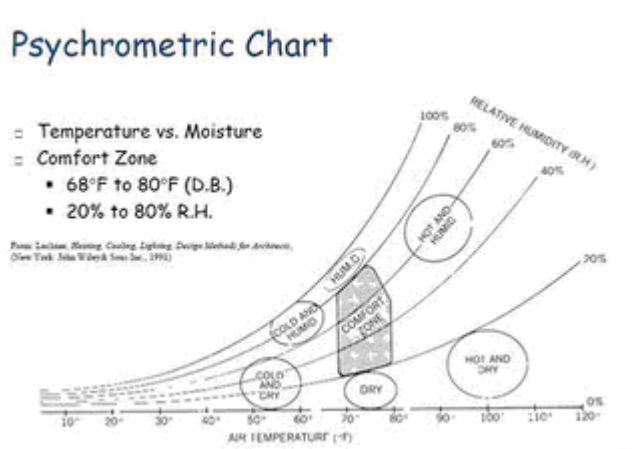
Terms	Description
Normally Closed (NC):	The term "normally closed" typically means the valve, damper, or other control device shall remain in or go to the closed position when the control air pressure, the control power or the control signal is removed. The position the device will assume when the control signal is removed.
Normally Open (NO):	The term "normally open" typically means that the valve, damper, or other control device shall remain in, or go to, the open position when the control air pressure, the control power, or the control signal is removed. The position the device will assume when the control signal is removed.
Nozzle:	An air terminal device designed to generate a low energy loss and thus produce a maximum throw by minimum entertainment.
NSF:	National Sanitation Foundation
Occupational Safety and Health Administration: (OSHA)	The regulatory arm of the US Department of Labor, which promulgates safety and health standards, facilitates training programs, and enforces regulations on work sites. OSHA has developed permissible exposure limits for over 600 contaminants present in the industrial workplace.
Occupied Zone:	The volume of a conditioned space containing the occupants of the space. Typically this is taken as extending from floor level up to a height of 1.8 m (6 ft), and sometimes considered as set in 0.6 m (2 ft), on plan, from external walls.
Ohm:	A unit of measure of electrical resistance. One volt can produce a current of one ampere through a resistance of one ohm.
Oil Powered:	A water heater that uses oil as its fuel source.
Oil Separator:	A device for separating out oil entrained in the discharge gas from the compressor and returning it to the crankcase.
One-Pipe System (Hot Water):	A hot water heating system in which one-pipe serves both as a supply main and also as a return main. The heating units have separate supply and return pipes but both are connected to the same main.
One-Pipe System (Steam):	A steam heating system consisting of a main circuit in which the steam and condensate flow in the same pipe and same direction. There is but one connection to each heating unit which must serve as both the supply and the return.
Open Circuit:	Electrical circuit (or relay) is open, not allowing electricity to flow across it.
Operating cost:	The cost of running a water heater for a given time period.
Option:	The term "option" typically means a choice from the specified products, manufacturers, or procedures which shall be made by the Contractor.
Organic Compounds:	Chemicals that contain carbon. Volatile organic compounds vaporize at room temperature and pressure. They are found in many indoor sources, including many common household products and building materials.
Original Equipment Manufacturer: (OEM)	Refers to the manufacturers of complete vehicles or heavy-duty engines, as contrasted with remanufactures, converters, retrofitters, up-fitters, and re-powering or rebuilding contractors who are overhauling engines, adapting or converting vehicles or engines obtained from the OEMs, or exchanging or rebuilding engines in existing vehicles.
Outdoor:	The term "outdoor" means items or devices not contained within the confines of a building, structure, or facility and items or devices which are exposed to weather. The term "outdoor" shall generally reference to outdoor ductwork, piping, or equipment.
Outdoor Air Supply:	Air brought into a building from the outdoors (often through the ventilation system) that has not been previously circulated through the system. Also known as "Make-Up Air."
Outdoor Coil:	An air-cooled heat exchanger typically made of several rows of copper tubing with aluminum fins. Its purpose is to cool the refrigerant gas back to the liquid form. *(See also Condenser Coil).*
Outside Air:	This term can denote either the air outside a building, or air taken into a building that has not previously been circulating through the HVAC system.

Terms	Description
Outside Air Ductwork:	The term "outside air ductwork" means all ductwork carrying un-conditioned air from the outside to a fan or air handling unit. Outdoor air ductwork extends from the intake point or louver to the fan, air handling unit, or connection to the return air ductwork.
Outside-air economizer:	An HVAC control strategy that uses outside air under suitable climate conditions to reduce the required mechanical cooling. When the outside air temperature is less than the required supply air temperature during cooling periods, the economizer allows a building's mechanical ventilation system to use up to 100% outside air, thereby reducing the energy required to cool the mixture of outside air and warm recirculated air under normal operating conditions. This method of cooling, often described as 'free cooling', is widely used in temperate climates where outside air temperatures rarely go above 21-24°C (70-75°F) during most days and will periodically be less than the supply air temperatures (night time economizer cycles are frequently employed for energy efficiency).
Overhead Systems:	A typical, overhead air distribution system supplies air to, and removes air from, a conditioned space at ceiling level. Both supply and return grilles are located in the ceiling plane, above which there will be a ceiling plenum of sufficient depth to accommodate the extensive supply ductwork, as well as other building services. Relying on the principle of mixing-type air distribution, ceiling-based supply and return systems are designed to condition the entire volume of the space (floor-to-ceiling), thereby providing a single uniform thermal and ventilation environment.
Overload:	A safety device designed to protect a piece or component of equipment, in the event of an overload or power surge.
Ozone Depletion Factor:	A ratio used to show how much a particular refrigerant or chemical will harm the ozone layer. R-11 and R-12 are the base and their number is 1. R-22 is .05, hence has 1/20th the potential for harming the ozone layer.
Ozone Generator:	An air cleaning device that produces highly reactive ozone, which reacts with volatile organic compounds to form non hazardous products, removes particulates, and reduces the number of bio-contaminants. These devices are controversial because their touted benefits may only be accomplished at ozone levels above recommended exposure levels.
Ozone Hole:	Thinning of the ozone layer located in the stratosphere high above the Earth. Ozone holes have been found above Antarctica, Canada and northern parts of the United States, as well as above northern Europe.
Ozone:	A kind of oxygen that has three atoms per molecule instead of the usual two. Ozone (O_3) is a highly reactive form of oxygen and is considered hazardous. Ozone exposure can result in mucous membrane irritation and potential pulmonary damage. The ozone layer in the upper atmosphere shields life on earth from deadly ultraviolet radiation from space.
Package Unit or Package System:	A self-contained unit or system that has the Air Handler & Condenser in same unit. Some call this a unitary system. All of the major air conditioning system components are in one box. In most cases the thermostat is not in the box but located in the space to be heated or cooled. Packaged units provide both heating and cooling from one unit that is placed outside the home; on the ground, on the roof, or sometimes mounted through the walls of the building.
Panel Heating:	A method of heating involving the installation of the heating units (pipe coils) within the wall, floor or ceiling of the room.
Panel Radiator:	A heating unit placed on, or flushes with, a flat wall surface and intended to function essentially as a radiator.
Parallel System:	Two or more identical size heaters piped with water connections, that is, cold water travels equal distance into the inlets of the heaters from a "t" connection and hot water travels equal distance from the outlet of the heaters to a "t" connection

Terms	Description
Partial Pressure:	The pressure exerted by any individual gas in a mixture.
Particle Size:	Particle size refers mainly to the solid particles of which materials are composed. The smaller the particle, the greater will be the total exposed surface area compared to its volume.
Particulates:	Small airborne particles found in indoor environments which include fibrous materials, solid-state semi-volatile organic compounds, and biological materials.
Pascals: (Pa)	A small unit of air pressure. One pound per square inch equals 6,895 pascals.
Passive Diffuser:	Any air supply outlet that relies on a pressurized underfloor plenum to deliver air from the plenum through the diffuser into the conditioned space of the building. Passive diffusers have no local fans associated with them, although they can be converted to an active diffuser by attaching a fan-powered outlet box to the underside of the diffuser.
Passive Smoking:	The inhalations of environmental tobacco smoke; also called involuntary smoking.
Pathogen:	Any microorganism or substance that causes disease.
Peak Hour Demand:	Time when the largest demand for hot water is needed.
Peak Load Period:	That period of the day when the system has the greatest demand.
PELs:	Permissible Exposure Limits (standards set by the Occupational, Safety and Health Administration).
Penn Control:	A refrigerant pressure control. It senses pressure and opens or closes a switch that could control a fan. It could also be a water control valve for a water-cooled unit.
Performance:	The degree to which a facility or system fulfills the purposes for which it was built or acquired, or which it is now expected to fulfill; a function of effectiveness, reliability, and cost.
Perimeter Zone:	This is the zone immediately adjacent to, and within 5 m (15 ft) of the external façade. Perimeter spaces require special consideration in terms of their heating and cooling loads which are significantly different to those of internal/core zone areas due to the influence of factors such as solar gain and fabric heat loss through the building envelope.
Perm:	An empirical unit of water vapor permanence of one grain (1/7000 lb.) flowing through one square foot induced by a vapor pressure of one inch of mercury.
Permeable:	Porous, allowing the passage of air.
Pesticides:	Pesticides are chemicals that are used to kill or control pests which include bacteria, fungi, weeds, and other organisms, in addition to insects and rodents. Most pesticides are inherently toxic. Most contain volatile organic compounds.
Picocurie (pCi):	A unit for measuring radioactivity often expressed as picocuries per liter (pCi/L) of air.
Pilot:	A small burner used to ignite the main burner
Piping:	The term “piping” include pipes, fittings, valves, flanges, unions, traps, drains, strainers, insulation, hangers, supports, and all other appurtenances comprising a complete and operable system. The HVAC piping includes chilled water piping, cooling water or condenser water piping, and refrigerant piping. The water piping is usually carbon steel while the commercial air-conditioning applications using Freon based refrigerants use copper piping.
Pitch:	The slope of a pipe line for the purpose of improving drainage.
Pitot Tube:	A device comprising a small diameter orifice projecting directly into an air stream measuring total pressure, and surrounded by an annular section with small diameter entrances normal to the flow measuring static pressure; both sections are usually connected to a manometer to indicate velocity pressure.
Plans and Specifications:	The means by which designers convey what is to be constructed; *contractors* bid for the construction assignment. *(See also Specifications).*

Terms	Description
Plenum:	Any defined space, typically above a suspended ceiling or beneath a raised floor, through which supply air and/or voice, power and data cabling and other building services can be distributed.
Plenum Chamber:	An air compartment maintained under pressure and connected to one or more distributing ducts.
Plenum Height:	The vertical distance between the top surface of a structural floor slab and the top surface of the raised floor system above it, which contains and defines the underfloor plenum. Accounting for the typical thickness of raised floor panels, the clear space within the underfloor plenum will be 33 mm (1.3 in.) less than the plenum height.
Plenum Inlet:	Any location in an underfloor plenum where conditioned air that has been ducted from the air handler is discharged into the plenum.
Plenum Partition:	A partition, typically formed from a vertically oriented sheet metal, is erected within the plenum in order to divide up the plan of a conditioned space and create separate zones within the underfloor area. *(See also Zoning).*
Pneumatic:	Having to do with air, pneumatic controls are controls that use compressed air as power to operate the control system.
Point of Use:	Small water heater used for remote locations.
Pollutant Pathways:	Avenues for distribution of pollutants in a building. HVAC systems are the primary pathways in most buildings; however, all building components interact to affect how air movement distributes pollutants.
Positive Pressure:	Condition that exists when more air is supplied to a space than is exhausted, so the air pressure within that space is greater than that in surrounding areas. Under this condition, if an opening exists, air will flow from the positively pressurized space outward to surrounding areas.
Power Venting:	Mechanical draft exhaust to outside, usually utilizing room air to support combustion.
Power:	Electricity for use as energy is referred to as power. Electrical power is usually measured in watts. Also used for a measurement of capacity.
PPM: (Parts Per Million)	A unit which may be mass/mass and hence represents a direct measure of fractional mass, or volume/volume and represents in this case a molar fraction at low pressures and high temperatures; commonly used to represent the degree of pollutant concentration where the concentrations are small.
Pre Designed Analysis:	Analysis involved in developing conceptual design alternatives and working out a variety of design details before the actual detailed design begins.
Pre-charged Line:	Refrigerant line which is filled with refrigerant and is sealed at both ends. The seals are broken when the line is installed and the line charge becomes part of the total system charge.
Preheated Water:	Water that has been tempered for inlet supply.
Present Value:	A concept in economics reflecting the time-value of money in which costs and revenues of future years are expressed in terms of their equivalent amounts if incurred in the present year; sometimes termed "discounted value;" may be computed for costs or benefits using the discount rate. *(See also Economic Cost).*
Pressed Wood Products:	A group of materials used in building and furniture construction that are made from wood veneers, particles, or fibers bonded together with an adhesive under heat and pressure.
Pressure Balancing:	The process of neutralizing pressure differences within a home.
Pressure Coefficient:	A dimensionless parameter relating the static pressure potential of a fan to its tip velocity pressure equivalent. It's used to determine approximate fan diameter.
Pressure Drop:	The decrease in pressure due to friction of a fluid or vapor as it passes through a tube or duct or/and lift.
Pressure Reducing Valve:	A valve which automatically reduces inlet water pressure to a specified value at its outlet.

Terms	Description
Pressure- Temp Relations:	The change effected in temperature when pressure is changed or vice versa. Only used at saturated conditions. An increase in pressure results in a temperature increase. A decrease in temperature results in a pressure decrease.
Pressure, Static:	In flowing air, the total pressure minus velocity pressure. The portion of the pressure that pushes equally in all directions.
Pressure, Total:	In flowing air, the sum of the static pressure and the velocity pressure.
Pressure, Velocity:	In flowing air, the pressure due to the velocity and density of the air.
Pressure Washing:	The use of high-pressure water and chemicals to clean. Power washing equipment for HVAC usually operating between 350 PSI and 500 PSI, and are used to clean the condenser and evaporator coils. Higher pressure can damage the fins on the coils.
Pressurized Plenum:	In this system configuration, the underfloor plenum is under a positive static pressure produced by the central AHU that drives the air along the plenum and up through the diffusers. Typical pressures are quite low (12.5-50 Pa [0.05-0.2 in. H2O]).
Preventive Maintenance:	Regular and systematic inspection, cleaning, and replacement of worn parts, materials, and systems, helps to prevent their failure by ensuring that parts, materials and systems are in working order.
Primary Air Flow Rate:	Volume of air entering a supply air terminal device within a time unit.
Process Heating:	Energy Efficiency program promotion of increased electric energy efficiency applications in industrial process heating.
Procurement:	The term “procurement” typically means to purchase, procure, acquire, and deliver complete with related accessories.
Programmable Controller:	A device that controls the operation of electrical equipment (such as air conditioning units and lights) according to a preset time schedule.
Project Site:	The term “project site” typically is defined as the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other Work as part of the project or another project.
Provide:	The term “provide” typically means to furnish and install, complete and ready for intended use and successfully tested to demonstrate satisfactory operation as applicable in each instance.
Psychogenic Illness:	Syndrome defined as a group of symptoms that develop in an individual (or a group of individuals in the same indoor environment) who are under some type of physical or emotional stress. This does not mean that individuals have a psychiatric disorder or that they are imagining symptoms.
Psychosocial Factors:	Psychological, organizational, and personal stressors that could produce symptoms similar to those caused by poor indoor air quality.
Psychrometer:	A device having both a dry and wet bulb thermometer. It is used to determine the relative humidity in a conditioned space. Most have an indexed scale to allow direct conversion from the temperature readings to the percentage of relative humidity.
Psychrometric Chart:	A graphical representation of the properties of moist (humid) air, usually including dry bulb and wet bulb temperatures, specific and relative humidity, dew point temperature, partial vapor pressure, humidity ratio, enthalpy, and specific volume. The chart graphically expresses how various properties relate to each other, and thus is a graphical equation of state.

Terms	Description
	
Psychrometrics:	The branch of science (physics) concerned with the measurement or determination of atmospheric conditions; particularly of moist air.
PTAC - Packaged Terminal Air Conditioner:	An air conditioner and heater combined into a single, electrically-powered unit; typically installed through a wall and often found in hotels. *(See also Package Units).*
P-Trap:	Pipe fitting that is used to trap water in a condensate line to prevent air and odors in sewer lines from entering the conditioned air stream.
Pulley/sheave:	Flat wheel with a V-groove. Power transmission component attached to a motor or blower wheel that connects the motor to the blower using one or more belts. Typically they are grooved to accommodate a V-belt.
Pumpdown:	Process of pumping refrigerant out of the evaporator and suction line at the end of the on-cycle by closing a solenoid valve in the liquid line and letting the compressor shut-off by the low pressure control.
Quick Connect:	Name given to the end connections on pre-charged lines which screw on to mated fittings of the outdoor and indoor sections. Tightening the quick connections ruptures the seals on the fittings and the line charge becomes part of the total system charge.
Radiant Barrier:	A device designed to reduce or stop the flow of radiant energy.
Radiant Heat Transfer:	Occurs when there is a large difference between the temperatures of two surfaces that are not touching but are exposed to each other.
Radiant Heating:	A heating system in which the heating is by radiation only.
Radiant:	System that uses hot surfaces to radiate or convect heat into the environment without the use of fans or blowers.
Radiation:	The transfer of heat without an intervening medium. It is absorbed on contact with a solid surface.
Radiator:	A heating unit located within the room to be heated and exposed to view. A radiator transfers heat by radiation to objects "it can see' and by conduction to the surrounding air which in turn is circulated by natural convection.
Radioactive Decay:	The disintegration of the nuclei of the atoms of radioactive (charged) elements with the concomitant release of alpha, beta, or gamma rays.
Radon (Rn) and Radon Decay Products:	Radon is a radioactive gas formed in the decay of uranium. The radon decay products can be breathed into the lung where they continue to release radiation.
Raised Access Floor:	A platform built several inches above the structural floor in a building, creating a space to house mechanical, electrical and communication distribution equipment; a type of *accessible service area*.

Terms	Description
Raised Floor:	A platform structure typically consisting of 0.6 m x 0.6 m (2 ft x 2 ft) concrete-filled steel floor panels supported on pedestals 0.2 to 0.46 m (8 in. to 18 in.) above the concrete structural floor slab. Each panel can be independently removed for easy access to the underfloor plenum created below and can include openings for electrical outlets, grilles or any other floor accessory in its thickness. In most office installations, carpet tiles are laid on top to provide a finished floor surface. Raised floor systems provide maximum flexibility and significantly lower costs associated with reconfiguring building services.
Rated Storage Volume:	Quantity of water (expressed in gallons) stored in a tank.
Reactivation:	Reactivation or regeneration is the process of removing adsorbed moisture held by a desiccant. By removing the moisture, the desiccant is again ready to adsorb moisture from an air stream. In rotary dehumidification equipment, the reactivation process is continuous and concurrent with the adsorption cycle and is accomplished by thermal heating of the desiccant. In dual tower packed bed dehumidification equipment, the reactivation process occurs with the dehumidifier "off stream" and is not concurrent with the adsorption cycle being accomplished by either thermal heating or pressure swings.
Receiver:	Tank on the liquid side of a system that holds excess refrigerant liquefied by the condenser.
Recessed Radiator:	A heating unit set back into a wall recess but not enclosed. This will normally require about 10% more Btuh then a free standing radiator.
Reciprocating Compressor:	The original compressor. Used for decades, this workhorse has pistons in it much like a car; the pistons move up and down creating compression of the Freon gas in the cylinders. Ring or Reed valves control the flow into and out of the cylinders.
Recirculated or Return air:	Return air that is diverted from the exhaust route, mixed with incoming outside air (in some systems, recirculated air bypasses the cooling coil and is mixed with the cool air leaving the coil to produce the warmer supply air temperatures used in UFAD designs), passed through the AHU for conditioning, and delivered to the conditioned space. Essentially a means of recycling the air circulating through an HVAC system for energy saving purposes.
Reclaiming:	Processing or returning used refrigerant to the manufacturer or processor for disposal or reuse.
Recool:	The sensible cooling of air that has been previously heated by HVAC systems serving the same building.
Recovery (GPH):	The amount of water in gallons that can be heated in one hour.
Recurring Costs:	Costs incurred on a recurring and generally regular basis throughout a facility's economic life; typically for operation, normal maintenance, and anticipated repair or replacement of *components* or *subsystems*.
Re-entrainment:	Situation that occurs when the air being exhausted from a building is immediately brought back into the system through the air intake and other openings in the building envelope.
Refrigerant Charge:	The amount of refrigerant contained within the air-conditioning equipment and required for proper operation.
Refrigerant Control:	A device used to meter the amount of refrigerant to an evaporator. It also serves as a dividing point between the high and low pressure sides of the system.
Refrigerant Distributor:	A device which meters equal quantities of a refrigerant to independent circuits in the evaporator coil.
Refrigerant Lines:	Two copper lines that connect the outdoor air-conditioner or heat pump to the indoor evaporator coil.
Refrigerant Migration:	The movement of refrigerant through the system to the compressor crankcase during the off-cycle, caused by its attraction to oil.

Terms	Description
Refrigerant Operating Charge:	The total amount of refrigerant required by a system for correct operation.
Refrigerant Velocity:	The rate at which a refrigerant is moving at a given point in a system, usually given in feet per minute (FPM).
Refrigerant:	A fluid that evaporates at a relatively low temperature, sucking heat and humidity out of the air. A refrigerant absorbs heat in an evaporator by change of state from a liquid to a gas, and releases its heat in a condenser as the substance returns from the gaseous state back to a liquid state.
Refrigeration Effect:	The amount of heat a given quantity of a refrigerant will absorb in changing from a liquid to a vapor at a given evaporating pressure. *(See also Tons of Refrigeration).*
Refrigeration:	The transfer of heat from a place where it is not wanted to a place where its presence is not desirable.
Regeneration:	*See Reactivation.*
Register:	A grille with a built-in damper or shutter placed at the terminal end of the duct.
Reheat:	The heating of air that has been previously cooled either by mechanical refrigeration or dehumidification. It is reheated to what the room requires per the thermostat settings. It is energy inefficient and not recommended by various codes. Instead use VAV (variable air volume system).
Relative Humidity:	The percentage of water vapor present in a given quantity of air compared to the amount it can hold at its temperature. It is expressed in percent. The relative humidity is 100% (air is fully saturated) when DBT = WBT.
Relative Risk:	The ratio of health impact incidence among exposed individuals to incidence among unexposed individuals.
Relay:	A device used to open and close an electrical circuit. The relay may be actuated by a bimetal electrically heated strip, a rod wrapped with a fine resistance wire causing expansion when energized, a bellow actuated by expansion of a fluid or gas, or an electromagnetic coil.
Reliability:	The likelihood that a system's effectiveness will be sustained over a defined time horizon; may be measured as a probability.
Relief Air:	Air which is expelled from the building, having been brought in by an economizer cycle.
Relief Fan:	A fan which is applied in conjunction with an economizer cycle and located in the relief path from a building; not to be confused with a return fan. Relief fans are applied when the return path from the occupied zone to the air handling unit has an insignificant pressure drop (thus requiring no return fan). However, the restrictions in the relief path to the building exterior would cause the building to become over-pressurized when the economizer cycle is operating on high percentages of outdoor air if no fan is provided.
Relief Air Ductwork:	The term “relief air ductwork” mean all ductwork carrying air from a room, space, or area without the use of a fan or with the use of a return fan to be discharged to the outdoors. Relief air ductwork extends from the registers, grilles, or other relief openings to the outdoor discharge point, or from the return fan discharge to the outdoor discharge point.
Relief Valve (anti-siphon):	Prevents internal vacuum conditions that could drain a system by back siphonage; eliminates burned out electric elements and collapsed tanks
Relocate:	The term “relocate” means to carefully remove without damaging items and to install where shown on the contract documents and/or as directed by the Engineer and/or Owner.
RELs:	Recommended Exposure Limits: Recommendations made by the National Institute for Occupational Safety and Health (NIOSH)).
Remediate:	Fix
Remove:	The term “remove” means to disassemble, dismantle, and/or cut into pieces in order to remove the equipment from the site and to properly dispose of the removed equipment and pay for all associated costs incurred.

Terms	Description
Renewal:	Substantial repairs and improvements in a *facility* or *subsystem* that return its performance to levels approaching or exceeding those of a newly constructed facility.
Replace:	The term "replace" typically means to remove the existing equipment and to provide new equipment of the same size, capacity, electrical characteristics, function, etc., as the existing equipment.
Residential:	The residential sector is defined as private household establishments which consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use.
Resistance: (Electrical)	The ability of all conductors of electricity to resist the flow of current; turning some of it into heat. Resistance depends on the cross section of the conductor (the smaller the cross section, the greater the resistance), the material, the length of the flow path, and its temperature (the hotter the cross section, the greater its resistance).
Resistance: (Thermal)	The reciprocal of thermal conductance. *(See also R-VALUE).*
Respirable Suspended Particulates:	Particulates less than 10 μm in diameter that can enter the respiratory tract.
Retrofit:	The redesign and reconstruction of an existing *facility* or *subsystem* to incorporate new technology, to meet new requirements, or to otherwise provide *performance* not foreseen in the original design.
Return Air:	The air extracted from a conditioned space (typically at ceiling level) and returned to the air-handling unit (AHU) where a portion is recirculated and the remainder is exhausted to the outside.
Return Air Ductwork:	The term "return air ductwork" means the assembly of ducts that carries air from the enclosed space to the air handler. Return air ductwork extends from the registers, grilles, or other return openings to the return fan (if used) and the air handling unit.
Return Circulation System:	Tempered water from or near the point of usage which eliminates waste of hot water used for long runs and adds storage to the system.
Return Fan:	A fan which is applied in an air handling system when the restrictions in the return air flow path from the occupied zone to the air handling unit would cause the building to become overpressurized. Without a return fan, the supply fan must pressurize the occupied zone to a value that is high enough to overcome the return path restrictions. If this pressure exceeds 0.10 to 0.15 inches w.c., a variety of problems can ensue, including a reduction in supply flow and blown open doors.
Return Mains:	The pipes which return the heating medium from the heating units to the source of heat supply.
Reversing Solenoid:	The magnetic solenoid that operates the reversing valve.
Reversing Valve:	A mechanical valve operated by a solenoid which only exists in a heat pump. When energized, this valve shifts, thereby reversing the flow and direction of the Freon gas.
Review:	The term "review" typically means observation or checking to ascertain general conformance with the design concept of the work and with information given in the Contract Documents.
RF (Recovery Factor):	Rating based on the efficiency of the product which is input required to raise 1 gallon of water by 1 degree F.
Riser:	A vertical tube or pipe which carries refrigerant or any fluid in any form from a lower to a higher level.
Rotor:	1) That part of the induction motor that rotates. 2) A formed structure, sometimes corrugated, containing a series of parallel flute shaped channels that hold and contain a desiccant within the flute wall for use in a dehumidifier.

Terms	Description
Roof Top Unit:	A packaged air-handling unit, defined as either "recirculating" or "once-through" design, made specifically for outdoor installation. They most often include internally their own heating and cooling devices. RTUs are very common in some regions; particularly in single-story commercial buildings.
RPM:	Revolutions per minute which is the measurement of a fan blade speed.
RSES:	A leading HVAC/R Association: Refrigeration Service Engineers Society, http://www.rses.org/
RTU – Roof Top Unit:	*See Roof Top Unit*
R-Value:	Refers to the insulation's resistance to heat flow. It is a measure of the resistance to transmission of heat by an insulating material in Btu/(ft^2 F). The higher the insulation's R-Value, the greater its insulating power.
S.E.E.R.:	Seasonal Energy Efficiency Rating.
Safety Shut-off Valve:	A device on a gas appliance which shuts off the gas supply to the appliance to prevent a hazardous situation. A flame failure safety shut-off operates when the actuating flame becomes extinguished. A 100% shut-off cuts off all gas including the main and pilot burners
Sanitizer:	Anti-microbials used for public health uses. An anti-microbial is a sanitizer that reduces (at least 99.9% in the number of each test microorganism over the control) but does not eliminate all the microorganisms on a treated surface.
Saturated Vapor:	Vapor in contact with a liquid.
Saturation Temperature:	Also referred to as the boiling point or the condensing temperature. This is the temperature at which a refrigerant will change state from a liquid to a vapor or visa versa.
Saturation:	A condition of stable equilibrium of a vapor and a liquid. The air is 100% saturated when DBT = WBT.
Scale:	A thin coating or layer, usually calcium on the bottom of a tank or interior parts, which may prevent heat transfer.
Scheduled Start/Stop:	Starting and stopping equipment based upon the time of day and the day of the week.
Scroll Compressor:	A scroll compressor is named as such for the shape of the internal compression device. Two plates with intermeshed "scrolls" of steel spin in opposite directions at high rates of speed. These two spinning plates create suction in the center of them, pulling in cool vapor. They literally "sling" the gas outwards, thereby compressing it and releasing it to the outside. Scroll compressors are very reliable and tough. These are available up to 50-ton refrigeration capacities.
Sealed Combustion:	Sealing of combustion chamber to prevent spillage of combustion products.
Seasonal Energy Efficiency Ratio (SEER):	The total cooling of a system covered by this standard with a capacity <65,000 Btu/h [19,000 W] during its normal usage period for cooling (not to exceed 12 months) divided by the total electric energy input during the same period. Expressed in Btu/ [Wh]. Higher SEER = more efficiency Old systems typically around 7 to 10; newer ones up to 15. Worst one you can buy today is 13. SEER is the most common method of selecting and understanding energy efficiency in the cooling products. The U.S. Government's minimum efficiency level is 10 SEER for split systems and 9.7 for packaged units. After January 1, 1992, the minimum SEER required by the DOE is 10.00 and 15.00+ SEER is considered high efficiency.
Secondary Air Motion:	Air discharged from an outlet creates a swirling, jet, or other air motion that pulls (entrains) the surrounding air into its path where it mixes with the supply air. *(See also Entrainment).*
Sediment (Lime):	The substance that settles on the bottom of a tank.

Terms	Description
Sensible Cooling Load:	The heat gain of the home due to conduction, solar radiation, infiltration, appliances, people, and pets. Burning a light bulb, for example, adds only sensible load to the house. This sensible load raises the dry-bulb temperature.
Sensible Heat:	Heat that results in a temperature change but not the state.
Sensitization:	Repeated or single exposure to an allergen that results in the exposed individual becoming hypersensitive to the allergen.
Sensor:	A device that can detect and measure a variable, for example, air temperature, velocity, humidity, or light levels.
Series System:	Generally where the primary heater preheats water to a given desired general purpose temperature and feeds into another heater.
Service Life:	The period of time over which a *facility, component,* or *subsystem* actually provides adequate performance; a technical parameter that depends on design, construction quality, operations and maintenance practices, use, environmental factors, and users' and owners' expectations; may differ from economic life, physical life, or design lifetime.
Service Plenum:	Any defined space, typically above a suspended ceiling or beneath a raised floor, through which supply air and/or voice, power and data cabling and other building services can be distributed.
Setback:	A reduction of climate control energy demand in HVAC controls when a building is unoccupied. To save energy, the temperature inside public buildings is allowed to fluctuate after business hours by lowering the space heating setpoint or raising the space cooling setpoint.
Setpoint:	The temperature to which a thermostat is set to result in a desired cooling or heated space temperature. The target value that an automatic control system controller will aim to reach.
Shall	The word “shall” in contracts parlance indicate action which is mandatory on the part of the Contractor.
Shell Space:	In a building, space for which the structural system and typically the exterior envelope are complete but in which other functional *subsystems* are left for completion at some future time.
Short-Circuiting:	Situation that occurs when the supply air flows to return or exhaust grilles before entering the breathing zone (area of a room where people are). To avoid short-circuiting, the supply air must be delivered at a temperature and velocity that results in mixing throughout the space.
Shorted:	This can also mean grounded. Sometimes things can be "shorted" together. If the two wires that make up your household extension cord were to ever touch each other when plugged in, that would result in a short.
Should:	The word “should” in technical writing typically indicates action which is probable on the part of the Contractor. (Same as “will”)
Shown:	The term “shown” is a cross-reference to graphic representations, details, notes, or schedules on the Contract Drawings, and to similar means of recording requirements in the Contract Documents.
Sick Building Syndrome: (SBS)	A phenomenon in which building occupants experience a variety of health and/or comfort effects linked to time spent in a particular building, but where no specific illness or causative agent can be identified. Symptoms in sufferers often include headaches, eye irritation, and respiratory irritation. Term that refers to a set of symptoms that affect some number of building occupants during the time they spend in the building and diminish or go away altogether during periods when they leave the building.
Sick Building:	A building in which the indoor air quality is considered to be unacceptable to a substantial majority of occupants.
Sight Glass:	A glass installed in the liquid line permitting visual inspection of the liquid refrigerant for the purpose of detecting vapor in the liquid. They generally contain a device to monitor moisture content of the refrigerant.

Terms	Description
Silica Gel:	A synthesized (manmade) adsorbent material consisting of amorphous silica. Silica gel can store or hold adsorbed moisture up to approximately 40% of its own weight. Silica gel's capacity (lbs. of moisture adsorbed per lb. of desiccant) varies with relative humidity at ambient temperature.
Similar:	The term "similar" in technical writing means generally the same but not necessarily identical.
Simultaneous Cooling and Heating Efficiency (SCHE):	Means the ratio of the total capacity of the system (heating and cooling capacity) to the effective power when operating in the heat recovery mode. (Where SCHE is stated without an indication of units, it shall be understood that it is expressed in Btu/ [Wh].)
Single Package:	A heating and cooling system contained in one outdoor unit.
Sizing:	Refers to the procedure to determine how large a furnace (measured in Btu per hour) is needed to heat a house or chiller/AHU capacity required to cool the space efficiently.
Sliding Inner Door:	A door slides along the combustion chamber radius for easy access to the burner and pilot
Slugging:	A condition in which a quantity of liquid enters the compressor causing hammering and possible compressor damage.
Smoke Stick:	A diagnostic tool used to observe air flow. Usually it consists of a chemical in a squeezable container. When squeezed it emits smoke which visibly follows air flow currents.
Sodium Silicate:	High volume synthetic silicate; non-toxic and non-combustible. Sodium silicate is the simplest form of glass. Gels are formed by treatment with acids, coagulated by brine and precipitated. *(See also Silica Gel).*
Soil Gas:	The gas present in soil which may contain radon.
Soil - Gas Retarder:	A continuous membrane or other material used to retard the flow of soil gases into a building.
Solar Heat Gain Coefficient (SHGC):	The solar heat gain coefficient, also called a shading coefficient, is a measure of how well a window absorbs or reflects heat from the sun. The lower the coefficient, the better the window is at blocking the sun's heat. Windows in hot or temperate climates should have a low SHGC; south-facing windows in cold climates should have a high SHGC.
Solenoid:	A magnetically operated coil that closes, opens, or shifts a valve. It is the control mechanism for a valve.
Sound Attenuators:	Components which are inserted into the air distribution system and designed to reduce airborne noise which is propagated along the ducts.
Sound Rating Number: (SRN)	Sound is measured in bels (a bel equals 10 decibels). The SRN of a unit is based on ARI test performed at ARI standard rating conditions. Average sound rating ranges from 7.0 to 8.0 decibels. The lower the SRN rating, the quieter the unit.
Source Control:	A preventive strategy for reducing airborne contaminant levels through removal of the material or activity generating the pollutants.
Sources:	Sources of indoor air pollutants. Indoor air pollutants can originate within the building or be drawn in from outdoors. Common sources include people, fixtures, furnishings, photocopiers, plants, food, etc.
Spark Ignition:	Intermittent ignition device that utilizes a spark to light a flame.
Specific Heat:	The amount of heat necessary to change the temperature of one pound of a substance by 1 °F.
Specifications:	An explicit description of the characteristics required of a facility or a component, or of the performance to be delivered; typically a part of the plans and specifications.
Specified:	The term "specified" is a cross-reference to paragraphs or schedules in the specifications and to similar means of recording requirements in the Contract Documents. The specifications include the General Provisions, Special Provisions and the Technical Specifications for the project.

Terms	Description
Specific Speed:	A dimensionless parameter based on fan rotational speed, flow rating and pressure rating. It's a tool used to select the type of fan for a specific application. Each different fan type achieves peak efficiency at a unique specific speed range.
Specific Volume:	The volume of a substance per unit of mass; i.e., standard air 13.33 cubic feet per pound. The reciprocal of density.
Split System:	This describes an air-conditioning or heat pump system that is split into two sections: an outdoor section and an indoor section. A refrigeration or an air-conditioning system that consists of a "hot" side or the condensing unit (including the condensing coil, the compressor and the fan) which is situated outside. The hot side is connected to the "cold" side located inside via supply and return refrigerant lines. The cold side consists of an expansion valve and a cold coil, and it is usually part of the furnace or some type of an air handler. The furnace blows air through an evaporator coil, which cools the air. This cool air is routed throughout the house by means of a series of air ducts. This type of set up is also used with heat pump installations.
Spore:	Molds reproduce by means of spores which are microscopic. They vary in shape and size (2 to 100 micrometers). Spores may travel in several ways: they may be passively moved (by a breeze or water drop), mechanically disturbed (by a person or animal passing by), or actively discharged by the mold (usually under moist conditions or high humidity).
Spread: (LS) (for a supply air terminal device)	Maximum distance between two vertical planes tangent to a specified envelope and perpendicular to a plane through the core center. The spread is generally referred to as the envelope corresponding to 0.25 m/s for zero supply temperature differential (i.e., under isothermal conditions).
Spud:	A threaded opening on the water heater tank.
Square Foot of Heating Surface:	Equivalent Direct Radiation (EDR). By definition, that amount of heating surface which will give off 240 Btu per hour when filled with a heating medium at 215 °F and surrounded by air at 70 °F. The equivalent square foot of heating surface may have no direct relation to the surface area.
SRN: (Sound Rating Number)	Sound is measured in bels (a bel equals 10 decibels). The SRN of a unit is based on ARI test performed at ARI standard rating conditions. Average sound rating ranges from 7.0 to 8.0 decibels. The lower the SRN rating, the quieter the unit.
Stack Effect (aka Chimney Effect):	The movement of air into and out of buildings, chimneys, flue gas stacks, or other containers, and is driven by buoyancy. When the building is warmer than the ambient environment, the air in the building is less dense than the air outside at ground level. Thus, outdoor air tends to enter the building through cracks and open doors on the lower levels. This air then, moves upward through the building via shafts and other vertical openings, and exits the building through cracks and openings in the upper levels. The flow pattern reverses during the summer months when the temperatures inside the building are cooler than the ambient environment. The stack effect helps drive natural ventilation and infiltration.
Stagnant Zone:	A volume of a space in which there is low air velocity and the potential for increased stratification and poorer air quality.
Stand By Loss:	The amount of heat lost while a unit is in a stand-by mode.
Standard Air Density:	.075 pounds per cubic foot. Equivalent to dry air at 70 °F and at sea level pressure.
Standard Air:	Standard air is dry air (no moisture content) with its properties measured at a referenced altitude, temperature, and pressure. IP: 0.075 lb/ft3 at sea level, 68 °F, 29.921 inches Hg. SI: 1.29 g/liter at sea level, 20 °C, 101.325 kPa (760 mm Hg). (*See also Dry Air*). Standard air values are used in HVAC calculations and rating of equipment performance to allow for a means of comparison. Correction factors for altitude and temperature are applied to calculations and performance data in order to determine the performance of equipment at "actual" conditions.

Terms	Description
Standard Cubic Feet per Minute (SCFM):	The volumetric rate of airflow at standard air conditions.
Standard:	A basis for comparison and assessment of the behavior or characteristics of a system, established by law, regulation, consensus, or common practice. *(See also Benchmark).*
Start-up	Start-up activity of a building includes testing and adjusting HVAC, electrical, plumbing, and other systems to assure proper functioning and adherence to design criteria. It follows a set criteria and instructions based on codes and specifications.
State Condition:	Substances can exist in three states: solid, liquid or vapor.
Static Pressure:	Pressure is the force exerted per unit area by a gas or liquid in ductwork. In air distribution systems, static pressure is equal to the total pressure minus velocity pressure and represents the pressure exerted by the air at rest. Air distribution pressures are typically measured in inches of water (in. H2O) or Pascals (Pa). *(See also Pressure, Static; Pressure, Total; and Pressure, Velocity).*
Static Tap:	A means by which static pressures of a duct system may be read directly; usually consisting of a small diameter hole in the side of the duct connected to a manometer.
Statistical Significance:	The probability that and degree to which the results of an experimental study describe an actual relationship between two factors beyond that which might be expected by pure coincidence.
Stator:	The part of the motor that is fixed, typically found in the hub of the fan.
Steam Heating System:	A heating system in which the heating units give up their heat to the room by condensing the steam furnished to them by a boiler or other source.
Steam Trap:	A device for allowing the passage of condensate and air, but preventing the passage of steam.
Steam:	Water in the vapor phase. The vapor formed when water has been heated to its boiling point, corresponding to the pressure it is under.
Storage Tank:	A tank used to hold a specific volume of water.
Storm Windows:	An extra pane of glass or plastic added to a window to reduce air infiltration and boost the insulation value of a window. If you are considering adding storm windows, you should compare the costs to installing new energy-efficient windows.
Straight Cool:	This is an air-conditioner that uses different forms of heating such as Natural Gas, LP Gas, Electric Resistance heat and oil.
Strainer:	A filter applied on the pipes to retain the particulates while allowing the fluid to pass through; typically applied at the suction of pumps.
Stratification:	The creation of a series of horizontal layers of air with different characteristics (e.g., temperature, pollutant concentration) within a conditioned space. Underfloor air distribution (UFAD) systems and other displacement ventilation-based systems rely on the upward convection of air driven by thermal plumes to remove heat loads and contaminants from a space. This results in both thermal and pollutant stratification in which a layer of warmer, more polluted air forms above the occupied zone where it will not affect the occupants.
Stratification Level:	In a displacement ventilation system, a stratification level is established at the height in the room where the air flow rate in the thermal plumes equals the total supply air volume entering the room at or near the floor level. The stratification level divides the room into two zones (upper and lower) having distinct air flow conditions. The lower zone below the stratification level has no recirculation and is close to displacement flow. The upper zone above the stratification level is characterized by recirculating flow producing a fairly well mixed region. In a properly designed displacement ventilation system, the stratification level is maintained near the top of the occupied zone (1.8 m [6 ft]).

Terms	Description
Stratosphere:	The gases that encircle the Earth as part of the atmosphere. The stratosphere is a layer of the atmosphere 9 to 31 miles above the Earth. Ozone in the stratosphere filters out harmful sun rays, including a type of sunlight called ultraviolet B, which has been linked to health and environmental damage.
Subcooling:	Cooling of a liquid, at a constant pressure, below the point at which it was condensed. In refrigeration, subcooling refers to removing sensible heat from a refrigerant liquid.
Subcooled Liquid:	Liquid refrigerant which is cooled below its saturation temperature.
Sublimation:	A condition where a substance changes from a solid to a gas without becoming a liquid.
Sub-Membrane Depressurization System:	A system designed to achieve lower sub-membrane air pressure relative to crawlspace air pressure by use of a fan-powered vent drawing air from under the soil-gas-retarder membrane.
Submit:	The term “submit” shall mean, unless otherwise defined in greater detail, transmit to the Engineer for approval, information, and record.
Sub-Slab Depressurization System (Active):	System designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from under the slab.
Sub-Slab Depressurization System (Passive):	System designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building and connecting the sub-slab area with outdoor air, thereby relying solely on the convective flow of air upward in the vent to draw air from beneath the slab.
Subsystem:	Functional part of a *system*, and often used interchangeably with that term (e.g., the guide way and controls of a rail transit system, the heating subsystem of the *HVAC* system).
Such As:	The term “such as” shall always be taken in the most inclusive sense, namely “such as, but not limited to.”
Suction Line Accumulator:	A device located in the suction line that intercepts quantities of a liquid refrigerant, and thereby prevents damage to the compressor.
Suction Line:	A tube used to convey the refrigerant vapor from the evaporator outlet to the suction inlet of the compressor.
Super Cooled Liquid:	Liquid refrigerant cooled below its saturation point.
Superheat:	Superheat is the extra heat added to the refrigerant vapor beyond what is required to vaporize all of the liquid.
Superheated Vapor:	Refrigerant vapor heated beyond its saturation point.
Superheating:	Creating a rise in temperature by adding heat energy to a refrigeration vapor.
Supplementary Heat: (Emergency Heat)	The auxiliary or emergency heat provided at temperatures below a heat pump's balance point. It is usually electrical resistance heat.
Supply (Procurement):	The terms “supply” and “procurement” shall mean to purchase, procure, acquire, and deliver complete with related accessories.
Supply Air:	The air entering a space through an outlet, diffuser or grille, having been delivered from the air-handling unit (AHU).
Supply Duct:	The duct system through which supply air is delivered to the conditioned space from the AHU, local fan, or other air movement device. Supply air ductwork extends from the fan or air handling unit to all the diffusers, registers and grilles.
Supply Mains:	The pipes through which the heating medium flows from the boiler or source of supply to the run-outs and risers leading to the heating units.
Surface Thermometers:	As the name implies, surface thermometers have a temperature probe that can be placed directly on a surface to see what the temperature is.
Switchover Valve:	A device in a heat pump that reverses the flow of refrigerant as the system is switched from cooling to heating. Also called a reversing valve or four-way valve.

Terms	Description
Synthesized:	Manmade material designed and manufactured for specific properties similar or identical to naturally occurring elements or for enhanced performance or economy.
System:	Collection of *subsystems*, *components*, or *elements* that work together, e.g., to provide some major aspect of *infrastructure*'s services (such as a water distribution system, a building electrical system, etc.); the value of the assemblage is greater than the sum of its part. Also, a set of building *components* specifically designed to work together to facilitate construction (e.g., modular building system).
System Impedence:	The resistance to air flow when moving air through an airflow system. Examples: air filters, air grilles and abrupt changes in flow direction.
System Operating Point:	The point of operation of the air mover on its air performance curve. It is described by an airflow and static pressure point. The operating point is that point on the air mover performance curve where the system resistance curve crosses the air performance curve.
Systems Control:	The control of indoor air pollutants through the use of mechanical means such as ventilation control or air cleaning.
T & P Valve:	Temperature and Pressure Relief Valve: A safety device used to expel excess pressure or temperature from inside a tank.
Tankless Water Heater:	An instantaneous heater that does not require a storage tank.
Task/Ambient Conditioning (TAC) System:	Any space conditioning system that allows occupants to individually control the thermal environment in the localized zone of their work space while still maintaining acceptable environmental conditions in the building's ambient spaces (circulation and open-use spaces for example). This is typically achieved by enabling occupants to adjust the volume and direction of the air supply serving their workspace according to their personal preferences. Therefore TAC systems generally include a large number of supply diffusers throughout a building, of which many are located in close proximity to the occupants.
Temperature Differential:	The difference between the entering and leaving temperature for a given fluid. For example, a 10 °F evaporator temperature differential for a chiller would describe an operating condition, where the entering water temperature is 54 °F and the leaving is 44 °F.
Temperature Rise:	The number of degrees Fahrenheit (°F) the incoming cold water must be raised to reach the desired hot water temperature.
Temperature:	Temperature is a measure of heat content. **Dry bulb:** The temperature of an air sample indicated by an ordinary thermometer. **Wet bulb:** The temperature of an air sample indicated by a thermometer when the bulb is covered with a saturated wick over which the air passes at approximately 1,000 fpm, and when the air temperature reaches the equilibrium temperature of the water evaporating into the air. The heat of vaporization is supplied by the sensible heat of the air sample.
Testing, Adjusting, And Balancing (TAB)	The diagnostic and corrective procedures for HVAC controls and operating components to ensure provision of specified airflow rates and environmental conditions.
Therm:	Another measurement of heat; (1 therm = 100,000 Btu).
Thermal (Energy) Storage:	A design concept that lowers the amount of electricity needed for comfort conditioning during utility peak load periods. Buildings thermal energy storage system might, for example, use off-peak power to make ice or to chill water at night, later using the ice or chilled water in a power saving process for cooling during the day.
Thermal Comfort:	That condition of mind that expresses satisfaction with the thermal environment. Thermal comfort is influenced by both subjective and objective factors. Heat transfer between the human body and the environment, and hence acceptance of the thermal environment is influenced by a combination of environmental factors (air temperature, radiant temperature, air velocity, humidity) and personal factors (clothing

Terms	Description
	and activity level). There is also evidence that people who know they have control over their local thermal environment are more tolerant of temperature variations, making it easier to satisfy their comfort preferences.
Thermal Efficiency:	Ability to transfer and absorb heat from the fuel source into the water.
Thermal Expansion:	Water, a non-compressible liquid, expands when heated.
Thermal Mass:	Material within a building, such as concrete or brick, that absorbs and holds heat, thereby, lessening energy costs. Building thermal mass can be used to reduce the peak cooling load. For example, in summer, the building mass can be pre-cooled during non-peak hours in order to reduce the cooling load in the peak hours. As a result, the cooling load is shifted in time and the peak demand is reduced. The building mass can be cooled most effectively during unoccupied hours because it is possible to relax the comfort constraints.
Thermal Plume:	The upward movement of warm air due to buoyancy forces above a heat source (e.g., person, computer, lights) in a room. The air volume in a rising thermal plume increases with height as the plume entrains ambient air.
Thermal Stratification:	The creation of a series of horizontal layers of air having increasing temperature with height within a conditioned space. Underfloor air distribution systems, and other displacement ventilation-based systems, rely on the upward convection of air driven by thermal plumes to remove heat loads and contaminants from a space. This results in both thermal and pollutant stratification in which a layer of warmer, more polluted air forms above the occupied zone where it will not affect the occupants. *(See also Stratification).*
Thermal Zone:	A single or group of neighboring indoor spaces that the HVAC designer expects will have similar thermal loads. Building codes may require zoning to save energy in commercial buildings. Zones are defined in the building to reduce the number of HVAC subsystems, and thus initial cost. For example, for perimeter offices, rather than one zone for each office, all offices facing west can be combined into one zone. Small residences typically have only one conditioned thermal zone, plus unconditioned spaces such as unconditioned garages, attics, and crawlspaces, as well as unconditioned basements.
Thermistor:	Basically a semiconductor which has electrical resistance that varies inversely with temperature.
Thermocouple:	A small electric generator. Electron flow between the hot junction of 1,200 °F and the cold junction of 600 °F creates mV.
Thermodynamics:	The study of the transformation of energy into other manifested forms and of their practical applications.
Thermometer:	An instrument used to detect differences in the level of heat.
Thermostat Lower:	A device which automatically maintains a predetermined temperature in an appliance.
Thermostat Sub-base:	When installed with a thermostat, it permits selection of function for heating, cooling, automatic changeover and blower cycling or continuous operation.
Thermostat Upper:	A device which automatically maintains a predetermined temperature in an appliance, usually equipped with a safety shut-off.
Thermostat, Air-Sensing:	Thermostat unit in which a sensing element is located in the refrigerated space.
Thermostat, Setback: (Programmable Thermostat)	A state-of-the-art electronic thermostat with a built-in memory that can be programmed for different temperature settings at different times of the day. A device containing a clock mechanism, which can automatically change the inside temperature maintained by the HVAC system according to a preset schedule. The heating or cooling requirements can be reduced when a building is unoccupied or when occupants are asleep.

Terms	Description
Thermostat:	An automatic control device that is responsive to temperature and used to control temperature in a conditioned space or zone. This device communicates information to the HVAC control unit which adjusts the temperature or air flow volume of the supply air to maintain the temperature measured at the thermostat within a pre-programmed comfort range around a setpoint temperature.
Thermostatic Control:	A means of automatically controlling the operation of an HVAC system component, collection of components, or complete system in response to information about air temperatures as registered by one or more thermostats located within the conditioned space.
Thermostatic Expansion Valve (TXV):	A modulating flow valve that controls the flow of refrigerant to the indoor (evaporator) coil. This valve can sense leaving gas temperature and adjusts based on changing occupancy loads to create more capacity. This type of valve fails regularly.
Thermostatic Trap:	A type of steam trap, which opens by a drop in temperature such as when cold condensate of air reaches it, and closes it when steam reaches it. The temperature sensitive element is usually a sealed bellow or series of diaphragm chambers containing a small quantity of volatile liquid.
Threshold Limit Values: (TLVs)	Guidelines recommended by the American Conference of Governmental Industrial Hygienists.
Threshold: (IAQ)	The contaminant dose or exposure level below which there is no expected significant effect.
Throw: (ft)	The maximum distance between the center of the core and a plane which is tangent to a specified envelope and perpendicular to the intended direction of flow. The throw is generally referred to as the envelope corresponding to 0.25 m/s for zero supply temperature differential (i.e., under isothermal conditions).
Tight Building Syndrome: (TBS)	A condition in which a building is very tightly insulated against infiltration, its ventilation is reduced for energy conservation, and airborne contaminants are sufficiently elevated to cause health effects in occupants. Often used synonymously with sick building syndrome (SBS).
Time Delay:	Usually refers to a device that will not allow the condenser to restart for an average of 5 minutes.
Time Horizon:	The period of time considered by an analyst or decision maker in choosing among alternative designs or management strategies; typically the economic life is the primary factor in making decisions such as lease or purchase, build or buy, and renew or replace.
Tons of Refrigeration (TR):	The amount of heat necessary to completely melt one ton of ice in 24 hours. One tone of refrigeration is equal to heat extraction at 200 BTUs per minute, 12,000 Btus per hour, and 288,000 Btus in 24 hours. This is based on the latent heat of fusion for ice which is 144 Btus per pound. Typically, a window unit is less than 2 ton, central home AC is 1 to 3 tons and commercial is over 3 tons.
Tons/Tonnage:	The unit of measure for an air conditioning system's capacity. *(See also Tons of Refrigeration).*
Total Air Flow Rate:	Sum of the primary and secondary air flow rates which are moved in the treated space.
Total Efficiency:	A measure of an air mover efficiency based on its air horsepower in terms of flow and total pressure vs. required shaft input power.
Total Heat (Enthalpy):	Total heat energy in a substance. The sum of sensible and latent heat.
Total Home Comfort System:	The ultimate solution to providing consistent and customized home comfort, despite the ever-changing weather.
Total Pressure:	Pressure is the force exerted per unit area by a gas or liquid. In air distribution systems, the total pressure is equal to the sum of static pressure and velocity pressure. Air distribution pressures are typically measured in inches of water (in. H_2O) or Pascals (Pa). *(See also Static Pressure and Velocity Pressure).*
Total Pressure:	The sum of all partial pressures in a mixture of gases.

Terms	Description
Total Volatile Organic Compounds (TVOCs):	A measure representing the sum of all VOCs present in the air to provide an approximate indication of pollutant levels. Indoor air typically contains hundreds of different VOCs in very low concentrations, some of which can have additive effects.
Toxicant:	A substance that can cause tissue damage or otherwise affect organs or systems within the body.
Tracer Gas:	Compounds, such as sulfur hexafluoride, which are used to identify suspected pollutant pathways and to quantify ventilation rates.
Transformer:	A device, which through electromagnetic induction but without the use of moving parts, transforms alternating or intermittent electric energy in one circuit into energy of similar type in another circuit; commonly with altered values of voltage and current.
Transmittance:	The time rate of heat flow per unit area under steady conditions, from the air (or other fluid) on the warm side of a barrier to the air (or fluid) on the cool side, per unit temperature difference between the two sides.
Trap:	A depression or dip in refrigerant piping in which oil will collect. A trap may be placed at the base of a suction or hot gas riser to improve oil return up the riser.
Two-Pipe System (Steam or Water):	A heating system in which one pipe is used for the supply main and another for the return main. The essential feature of a two-pipe hot water system is that each heating unit receives a direct supply of the heating medium, which cannot have served a preceding heating unit.
2.5% Design:	"2.5% Design" refers to the outdoor conditions which a designer may assume for estimating the cooling load. Theoretically it means the outside summer temperatures and coincident air moisture content that will be exceeded only 2.5% of the hours from June to September. In other words, 2.5% design conditions are outdoor temperatures which historically exceeded 73 out of the 2,928 hours in these summer months.
UA:	A measure of the amount of heat that would be transferred through a given surface or enclosure (such as a building envelope) with a one degree temperature difference between the two sides. The UA is calculated by multiplying the U-Value, or overall heat transfer coefficient U, by the area of the surface (or surfaces) A.
Unconditioned Space:	A space that is neither directly nor indirectly conditioned space, which can be isolated from conditioned space by partitions and/or closeable doors.
Underfloor Air Distribution (UFAD) System:	A UFAD system uses an underfloor plenum (open space between the structural concrete slab and the underside of a raised floor system) to deliver conditioned air from the AHU directly into the occupied zone of the building. Air can be delivered through a variety of supply outlets typically located at floor level, or integrated as part of the office furniture and partitions. Return grilles are located at ceiling level, or at least above the occupied zone. Under cooling conditions, underfloor systems produce an overall floor-to-ceiling air flow pattern, similar in principle to displacement ventilation. This upward convection of warm air is used to efficiently remove heat loads and contaminants from the space. In contrast to true displacement ventilation systems, UFAD systems deliver supply air at higher volumes and higher velocities, thereby enabling higher heat loads to be met. The UFAD systems supply air at a higher temperature than that for ceiling-based systems (typically 18°C (65°F) for UFAD and 13°C (55°F) for ceiling HVAC).
Underfloor Plenum:	The volume of a conditioned space above the stratification level produced by a displacement ventilation system.

Terms	Description
Unit Heater:	A heating unit consisting of a heat transfer element, housing, a fan with driving motor, and outlet, deflectors or diffusers. It is usually suspended from the ceiling and its heat output is controlled by starting and stopping the fan by a room thermostat. The circulation of the heating medium (steam or hot water) is usually continuous. It is used mostly for industrial heating.
Unit Ventilator:	A fan-coil unit device for the use outdoor; return-air mixing is intended to satisfy temperature requirements and ventilation needs.
Upflow Furnace:	A furnace that pulls cool return air in from the bottom and blows/expels warm air out the top into the duct work. This type of furnace is usually installed in a basement or in an out-of-the-way closet.
Usable Storage:	The percentage of hot water that can be drawn from a tank before the temperature drops to a point that is no longer considered hot.
Useful Thermal Output:	The thermal energy made available for use in any industrial or commercial process, or used in any heating or cooling application, i.e., total thermal energy made available for processes and applications other than electrical generation.
U-value - (or U-factor):	More correctly called the overall heat transfer coefficient, describes how well a building element conducts heat. It measures the rate of heat transfer through a building element over a given area under standardized conditions. The usual standard is at a temperature gradient of 24 °C, at 50% humidity with no wind (a smaller U-value is better). U is the inverse of R with SI units of W/(m²K) and US units of BTU/(h °F ft²).
Vacuum Heating System (Steam):	A one- or two-pipe heating system equipped with the necessary accessory apparatus to permit the pressure in the system to go below atmospheric.
Vacuum:	Any pressure below atmospheric pressure.
Value Engineering:	Defined as an organized effort directed at analyzing the function of construction operations, systems, equipment, facilities, procedures, methods, and supplies to determine if anticipated costs are consistent with the requirements for performance, quality, safety, and maintainability.
Valves:	Components inserted into the pipes to regulate flow or permit shutdown/modification of the fluid flow. *(See also Gate, Globe, Butterfly and Check Valve).*
Vapor Barrier:	The term “vapor barrier” means an impervious layer of material superimposed upon a layer of insulation. Vapor barriers are always applied on the warm side of the insulation layer.
Vapor Heating System (Steam):	A two-pipe heating system which operates under pressure at or near atmospheric temperature and which returns the condensation to the boiler or receiver by gravity.
Vapor Pressure:	The pressure exerted by vapor.
Vaporization:	The change of state (phase) of a substance from liquid to vapor. Requires an input or energy.
Variable Air Volume (VAV):	A control strategy of an air supply system in which varying heating and cooling loads are met by adjusting the air flow volume, keeping the temperature of the air constant. Alternatively, a constant air volume, variable temperature (CAV-VT) system can be employed in which the temperature of the air flow is varied, while the volume is kept constant. This system is generally employed for the multiple zones for dedicated control and energy efficiency. In VAV system, fan energy is saved because the amount of air moved varies with the load. This is a powerful, non-linear relationship and all other things being equal, a 25% reduction in flow translates to a 58% reduction in fan horsepower. The need in most systems to maintain some fixed discharge pressure at the inlet to the terminal units detracts from this somewhat, but there are still significant savings to be realized. Dehumidification is greater with VAV systems than it is with constant volume systems which modulate the discharge air temperature to attain

Terms	Description
	part load cooling capacity. Control of the system's fan capacity is critical in VAV systems. Without proper and rapid flow rate control, the system's ductwork or its sealing can easily be damaged by over-pressurization.
VAV Box:	A variable air volume control box. Typically, a VAV box is ducted on its inlet and uses dampers to control the volume of air discharged from the unit.
Velocity Pressure:	Pressure is the force exerted per unit area by a gas or liquid. In air distribution systems, velocity pressure is the pressure due to the velocity and density of the moving air. Air distribution pressures are typically measured in inches of water (in. H_2O) or Pascals (Pa). *(See also Pressure, Static and Pressure, Total).*
Venturi:	The housing or frame of the fan.
Vent Valve (Steam):	A device for permitting air to be forced out of a heating unit or pipe and which closes against water and steam.
Vent Valve (Water):	A device permitting air to be pushed out of a pipe or heating unit but which closes against water.
Ventilation Air:	Defined as the total air which is a combination of the air brought inside from outdoors and the air that is being recirculated within the building.
Ventilation Effectiveness:	Ventilation effectiveness describes the system's ability to remove pollutants generated by internal sources in a space, zone, or building. In comparison, air change effectiveness describes the ability of an air distribution system to ventilate a space, zone, or building.
Ventilation Efficiency:	An evaluation of the pollutant removal capacity of a ventilation system.
Ventilation Rate:	The rate at which indoor air enters and leaves a building. Expressed in one of two ways: the number of changes of outdoor air per unit of time (air changes per hour, or "ach"), or the rate at which a volume of outdoor air enters per unit of time (cubic feet per minute, or "cfm").
Ventilated Spaces:	The term "ventilated spaces" typically means spaces or areas supplied with outdoor air on a continuous or intermittent basis. The outdoor air may be conditioned or unconditioned.
Ventilation Standard:	A specification for the minimum rate of input of outdoor air into indoor spaces. ASHRAE 62 standard provides indoor air quality guidelines.
Ventilation:	The process of intentionally supplying outside air to a building achieved by either natural or mechanical (forced) means. Such air may or may not have been conditioned or treated.
Ventilator:	A ventilator captures heating or cooling energy from stale indoor air and transfers it to fresh incoming air.
Venting Materials:	Materials used for venting; i.e. PVC, CPVC, ABS, metal.
Variable Frequency Drive (VFD):	A VFD (also called an Inverter) is a variable speed drive technology that varies the speed of an alternating current (A.C.) motor by varying the frequency of the A.C. power applied to it. In general terms, the drive circuitry rectifies the incoming A.C. utility power into pulsed direct current (D.C.) (hence the term "inverter"); modifies the frequency and voltage; then coverts the power back to A.C. for use by the motor. There are a variety of technologies used to accomplish the rectification and wave form modification.
Volatile Organic Compounds (VOCs):	One of a class of chemical compounds; indoor sources include tobacco smoke, building products, furnishings, cleaning materials, solvents, and office supplies. Sources that may emit VOCs into indoor air are housekeeping and maintenance products as well as building and furnishing materials.
Volt (V):	A unit of electromotive force. It is the amount of force required to drive a steady current of one ampere through a resistance of one ohm. Electrical systems of most homes and offices have 120 V in the US and 220 V in the UK.

Terms	Description
Watt (W):	A watt is a unit of electricity. One watt of power maintained over time is equal to one joule per second or 3.414 Btu per hour.
Warm Air Heating System:	A warm air heating plant consists of a heating unit (fuel-burning furnace) enclosed in a casing, from which the heated air is distributed to the various rooms of the building through ducts. If the motive head producing flow depends on the difference in weight between the heated air leaving the casing and the cooler air entering the bottom of the casing, it is termed a gravity system. However, a booster fan may be used in conjunction with a gravity-designed system. If a fan is used to produce circulation and the system is designed especially for fan circulation, it is termed a fan furnace system or a central fan furnace system. A fan furnace system may include air washers, filters, etc.
Waste Heat Recovery Unit (WHRU or HRU):	A device purchased as an accessory to an air/heating system to enhance the energy efficiency by recovering the waste heat to useful work. For instance, in the refrigeration system a WHRU mounts on the wall outside by the outdoor unit, and receives hot refrigerant gas from the compressor. Inside of it is a small circulating pump and a fluid heat exchanger. Water is pulled down the water lines from the water heater, and in effect heats the hot water in the home at no cost.
Water Hammer:	A concussion or sound of moving water against the side of a containing pipe or vessel.
Water Jacket:	The condenser coil of water serve unit. Water and hot Freon gas are pumped through this jacket in opposing directions. During this process, the water extracts heat from the Freon gas; essentially acting as a water-cooled condenser).
Water Manometer:	Used to measure pressure in inches of water.
Water Solenoid:	A magnetic solenoid that operates a water flow valve.
Water Vapor:	Water vapor can be treated as a gaseous state. Air can hold certain water vapor, which is a function of temperature. The higher the temperature, the more water vapor it can hold. At 100% Relative humidity, the air becomes fully saturated. This means it can no longer accept any moisture. The tendency of absorption increases with temperature.
Water-Source:	Water is being used as the heat source or heat sink for a heat pump. Sources of underground water are wells, and sources of surface water are lakes, large ponds and rivers.
Waterway Fitting:	A channel through which water can flow; connects water heater to inlet and outlet lines.
Watt Density:	Amount of watts concentrated per square inch of element blade surface area.
Watt-Hour: (W-hr)	One watt of power expended for one hour. An electrical energy unit of measure equal to 1 watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.
WBT:	Wet Bulb Temperature
Water Column (WC):	Common measure of air pressure used in HVAC systems.
Weather Stripping:	Specially designed strips, seals and gaskets installed around doors and windows to limit air leakage.
Weeping:	Tendency of a deliquescent material to become a liquid solution and "weep", drip, leak or run from a dehumidification wheel, typically using lithium chloride as the absorbent.
Wet Bulb Temperature (WBT):	Temperature read with a thermometer whose bulb is encased in a wetted wick. The wet bulb temperature and the dry bulb temperature (i.e. air temperature) are used to calculate relative humidity or dewpoint. At 100% relative humidity, the dry bulb temperature is equal to the wet bulb temperature.
Wet Return (Steam):	That part of a return main of a steam heating system which is completely filled with condensate water.

Terms	Description
Whole-House Fan:	A large fan used to ventilate an entire house. This is usually located in the highest ceiling in the house, and vents to the attic or the outside. Although whole-house fans are a good way to draw hot air from the house, they should be covered and insulated during the winter when they often continue to draw hot air from the house.
Will:	As a common accepted practice, the term 'will' typically indicates an action which is probable on the part of the Contractor. (Same as should).
Working Pressure:	Maximum pressure of the operating system permissible.
Yearly Cost:	The cost of operating for a year.
Year-Round:	A term used for an air-conditioner which uses gas or oil for heating.
Zeolite:	A natural mineral having desiccant properties. Synthetic zeolites, called molecular sieves, are made in a variety of forms and are used for dehumidification and also for treating the water hardness using the ion-exchange principle.
Zero-Pressure Plenum:	In this system configuration, the underfloor plenum is maintained at nearly the same static pressure as that of the conditioned space. Supply air is delivered to the plenum by the central AHU, and small fan-powered air outlets are used to discharge air from the plenum into the conditioned space. Some systems may create a slight negative pressure in the plenum to draw recirculated air (typically directly from the room through open floor grilles, or down from the ceiling through shafts) into the plenum where it is mixed with the supply air from the AHU. *(See also Pressurized Plenum).*
Zonal Control:	A method of designing and controlling the HVAC system so that occupied areas can be maintained at a different temperature than unoccupied areas, using independent setback thermostats. If specific requirements are met, zonal control may earn a credit towards compliance with whatever building energy efficiency standards are applicable.
Zone Heat:	A central heating system in a building, designed to allow different temperatures to be maintained in two or more parts of the building.
Zone:	A zone is defined as a space or group of spaces in a building having similar heating and cooling requirements throughout its occupied areas so that comfort conditions may be controlled by a single thermostat.
Zoning:	The practice of dividing a building into smaller zones for the HVAC system, thereby providing the opportunity to control comfort levels in each zone. For example, buildings may be zoned into individual floors, rooms, or spaces with distinct loads, such as perimeter and interior zones.