

GLOSSARY OF TERMS

ABS (Acrylonitrile Butadiene Styrene) — Plastic material used in the manufacture of pipe and fittings.

Absolute Pressure — Pressure measurements which are compared to absolutely no pressure at all, not even atmospheric pressure; e.g., psia and in. Hg abs.

ACR Tubing — Air conditioning and refrigeration tubing that is cleaned, dried, and sealed to keep contaminants from entering the tubing. It is often charged with dry nitrogen.

Adapter — Fitting that joins pipes of different materials or different sizes.

AFUE — Annual fuel utilization efficiency; the annualized average efficiency of a fuel-fired appliance, taking into account the effect of on-off operation.

AGA — American Gas Association.

Air Handler — The device that moves the air across the heat exchanger in a forced-air system. In a split system, it normally contains the blower fan, cooling coil, metering device, air filter, and related housing.

Alloy — Any substance made up of two or more metals.

Alternating Current (AC) — An electrical current that reverses (alternates) its direction of flow at regular intervals. AC is the primary source of energy for homes and businesses and is used when large amounts of energy are required. (See DC.)

Ambient Temperature — The temperature of the fluid (usually air) surrounding an object.

Ammeter — A device, calibrated in amperes, that is used to measure electric current.

Ampere or Amp (A) — A unit of electric current.

Anchor — A device used to fasten structural members in place.

Anemometer — An instrument used to measure the velocity of airflow.

Annealing — Heat treating to soften metal. Soft copper tubing is made by annealing hard copper.

Aquastat — A temperature-controlled sensory device. It can function both as an operating control and as a limit control. As an operating control, it can be used as the sensor to control the level of the water in a device reservoir based on the temperature of the water in the reservoir. As a limit control, it can be used to turn a device on or off based on the temperature of the water.

Armored Cable — A flexible, metallic-sheathed cable used for indoor wiring; commonly called *BX* or *Greenfield*.

Arrestor (Lightning Rod) — A device used to protect buildings, including electrical devices, from damage by lightning.

ASHRAE — American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

Aspect Ratio — In air distribution outlets, this represents the ratio of the length of the core opening of a grille face or register to the width. In rectangular ducts, it is the ratio of the width to the depth.

Atmospheric Pressure — The pressure exerted on all things on the Earth's surface that are a result of the weight of our atmosphere.

Automatic Changeover Thermostat — A thermostat that automatically selects either heating or cooling, depending on room temperature and the heating and cooling setpoints.

Axial Load — An external load that acts lengthwise along a shaft.

Back-Seated — The condition of a service valve in which the valve stem is turned fully counterclockwise and the valve is fully open.

Baffle — A sheet metal device that blocks or changes the direction of air, generally to make it turn a corner or distribute into a room.

Bonding — The permanent adhesion of metallic parts, forming an electrically-conductive path.

Boot — A fitting installed in the airstream at the termination of a branch duct to a room.

Box — A device used to contain wire terminations where they connect to other wires, switches, or receptacles.

Branch — The portion of the duct system connecting to a main duct.

Branch Circuit — Wiring between the last overcurrent device and the branch circuit outlets or load device.

Brazing — A method of joining metals using a nonferrous (no iron) filler at a temperature above 800° F.

Break-Away Torque — The torque required to loosen a fastener. This is usually less than the torque required to tighten the fastener.

Btu (British Thermal Unit) — The amount of heat required to raise the temperature of one pound of water 1° F.

Bruh (Btu's per hour) — The basic unit for measuring the rate of heat transfer.

Building Code — A set of rules governing the quality of construction in a community. The purpose of these rules is to protect the public health and safety.

Burr — A sharp, roughened, turned-in edge on a piece of pipe that has been cut but not reamed.

Bus Bar — A rigid conductor at the main power source to which three or more circuits are connected.

Bushing — (1) A pipe fitting with both male and female threads. Used in a fitting to reduce the size to connect pipes of different sizes. (2) A device used to mechanically protect and insulate electrical wires passing through abrasive openings.

Cable — A conductor consisting of two or more wires that are grouped together with an overall covering, such as a plastic sheath.

Capillary Action — Movement of a liquid (in soldering or brazing, nonferrous filler metal) along the surface of a solid in a kind of spreading action.

Capillary Tube — A long copper tube with a diameter of 1/16 to 1/8 inch. Used as a refrigerant metering device in small systems where there are relatively constant loads.

Carbide-Tipped — Refers to cutting tools that have small, extremely hard pieces of carbide steel welded to the tips.

Caulking — Putty-like mastic used to seal cracks and crevices.

Center Punch — A tool used to make an indentation at the centerline of a hole to be cut.

CFM (Cubic Feet per Minute) — The unit of measure of the volume rate of airflow, as in a heating system.

Chase — A channel formed in buildings to run electrical, plumbing, or mechanical lines; spaces inside finished walls and between floors used for running ductwork or vent pipes.

Cheek — The flat side of an elbow or offset.

Circuit — An electron path that completes a loop. Circuits generally consist of a power source, conductors, a load, and a switch to control current flow.

Circuit Breaker — A protective device that opens an electrical circuit when an overload occurs. There are thermal and magnetic types.

Clamp-On Ammeter — A meter with jaws that are placed around a conductor to measure the current flow through the conductor.

Coefficient of Performance (COP) — The ratio of work performed in relation to energy used. A rating method for heat pumps.

Collar — A short section of duct that connects to another duct or piece of equipment.

Combustion — The rapid oxidation of fuel gas accompanied by the production of heat, or heat and light.

Combustion Efficiency — Producing the most heat with the fewest impurities.

Combustion Products — The gases that result from combustion; also called *flue gases*.

Common Ground Connection — Where two or more grounded wires terminate.

Complete Combustion — Burning in which there is enough oxygen to prevent the formation of carbon monoxide.

Compound Gauge — A service gauge that has both pressure and vacuum scales.

Compression Joint — A method of connection in which tightening a threaded nut compresses a compression ring to seal the joint.

Compressor — A pump in a refrigeration system that takes refrigerant vapor at a low temperature and pressure and raises it to a higher temperature and pressure.

Condensate — The liquid formed by condensation of a vapor. In air conditioning, water extracted from air, as by condensation on the cooling coil of a refrigeration unit.

Condensation — The process by which a gas is changed into a liquid at constant temperature by heat removal.

Condenser — A heat exchange coil within a mechanical refrigeration system used to reject heat from the system. The coil where condensation takes place.

Condensing Furnace — A high-efficiency, gas forced-air furnace that uses a second condensing heat exchanger to extract the latent heat in the flue gas.

Condensing Unit — The portion of a split air conditioning or refrigeration system that is mounted outside and contains the compressor, condenser, condenser fan motor, and controls for these components; most used today are air-cooled.

Conductor — A substance or body that allows electricity or heat to pass through it.

Conduit — Rigid or flexible metal or plastic tubing used to enclose electrical wiring.

Connector, Solderless — A device (typically insulated plastic) that uses mechanical pressure rather than solder to establish a connection between two or more conductors.

Contact — A device consisting of a coil and one or more sets of contacts used to connect or disconnect a high-voltage circuit.

Continuity — A continuous current path. Absence of continuity indicates an open circuit.

Control Circuit — That portion of the total circuitry containing devices that apply power to or remove power from a load.

Cooling Capacity — The rate at which a device can remove heat from a substance, expressed in Btuh. For an air conditioner, it is the maximum rate at which it removes heat from a space.

Counterbore — Boring a larger hole partway through the stock so that the head of a fastener can be recessed.

Countersink — Making a flared depression around the top of a hole to receive the head of a flathead screw; also, the tool used to make the depression.

Coupling — A conduit or pipe fitting containing female threads on both ends. Couplings are used to join two or more lengths of conduit or pipe in a straight run to join to a fixture.

CPVC (Chlorinated Polyvinyl Chloride) — A type of plastic used to make pipe that will carry hot water and chemicals.

Crawl Space — The space between the floor framing and the ground in a building without a basement.

Crosscut — A cut made across the grain of lumber.

CU. FT. (cu. ft.) — Abbreviation for cubic foot or feet.

CU. IN. (cu. in.) — Abbreviation for cubic inch or inches.

Current — The rate of electron flow in a circuit. Current is measured in amperes.

Cycle — A complete positive and negative alteration of a current or voltage.

Damper — A bladed device used to vary the volume of air passing through an air outlet, air inlet, or duct.

Deadband — A temperature band, usually 3° F, that separates heating and cooling in an automatic changeover thermostat.

Defrost — In a heat pump, the process of cycling hot refrigerant through the outdoor coil to melt accumulated frost.

Dehumidification — The condensation of water vapor from air by cooling the air below the dewpoint or the removal of water vapor from air by chemical or physical methods.

Dehumidifier — A device used to remove moisture from the air.

Desiccant — Any absorbent or adsorbent, liquid or solid, that will remove water or water vapor from a material. In a refrigeration circuit, desiccant is contained in a filter-drier.

Device — A unit or component that carries but does not use current, such as a junction box or switch.

Dewpoint — The temperature of air at which the water vapor content is saturated.

Diffuser — An outlet that discharges supply air into a room in various directions and planes and is arranged to promote mixing of primary air with secondary room air.

Dilution Air — Air that enters the draft hood of a natural-draft, gas-fired furnace and mixes with the combustion products.

Direct Current (DC) — An electrical current in which the electron flow is in one direction. DC is used for low energy applications and allows for precise control.

Direct Vent System — A vent system for a fuel gas-fired appliance which is constructed so that all the air for combustion is drawn directly from the outside atmosphere and all the flue gases are discharged to the outside atmosphere.

Disconnect — A manual switching device used to remove power from a circuit. Usually mounted on or near air conditioning equipment.

Distribution Center — An electric panel used to distribute the electric supply to several branch circuits; can be of fusible or circuit breaker design.

Draft — The pressure difference that causes the flow of flue gases through a chimney or vent. See also Natural Draft and Induced Draft.

Draft Gauge — An instrument used to measure air movement by measuring very small air pressure differences.

Draft Hood — A device built into a natural-draft, gas-fired appliance to decouple the heat exchanger from the natural-draft vent so that updrafts, downdrafts, or blockages do not adversely affect the heat exchanger or combustion operation.

Drawband — Flat bar or metal strips with bolted ends; used to make airtight connections on round ductwork.

Drier — A manufactured device containing a desiccant placed in the refrigerant circuit. Its primary purpose is to collect and hold within the desiccant all water in the system in excess of the amount which can be tolerated in the circulating refrigerant.

Drop — The vertical distance that the lower edge of a horizontally projected air-stream drops between the outlet and the end of its throw.

Dry Bulb Temperature — Temperature measured using a standard thermometer. A measure of the sensible heat of the air or surface being measured.

Dual-Fuel Heating System — A system in which a heat pump is combined with a furnace.

Duct — A passageway made of sheet metal or other suitable material; used for conveying air or other gas at lower pressures.

Dump Zone — An uncontrolled area in a zoned system that is used to avoid low airflow problems that can result when two or more of the individual system zone dampers are closed, blocking off airflow to the zones.

Dynamic Seal — A seal made where there is movement between two mating parts, or between one of the parts and the seal.

Economizer — An HVAC device that substitutes outdoor air for the cooled air produced by the air conditioning system when outdoor air conditions permit. It also controls the amount of outdoor air used to ventilate a building.

Effective Area — The net area of an outlet or inlet device through which air can pass, equal to the free area times the coefficient of discharge.

Elbow — A pipe, conduit, or duct fitting that is used to change the direction of fluid flow.

Electrical Metal Tubing (EMT) — Another name for thinwall conduit.

Electric Heater — A device constructed of high resistance wire or other material which produces heat when a current is passed through it.

Electrolysis — The decomposition of one of two unlike metals in contact with each other in the presence of water.

Energize — To apply voltage to an electric device.

Energy Efficiency Ratio (EER) — The ratio of the rated cooling capacity in Btu's per hour divided by the amount of electrical power used in watts at any given set of conditions.

Enthalpy — The total heat content (sensible and latent) expressed in Btu's per pound of the substance (Btu/lb.).

Equal Friction Method — A method of duct sizing wherein the selected duct friction loss value is used throughout the design of a low-pressure duct system.

Equivalent Length of Pipe — The resistance of a fitting, as compared to the resistance of straight pipe having the same cross-section.

Evacuation — The process of removing air, moisture, and other gases from the inside of a refrigeration system.

Evaporator — A heat exchange coil within a mechanical refrigeration system used to absorb heat into the system; the coil where evaporation takes place.

Excess Air — In gas combustion, the amount of air in excess of that needed for complete (stoichiometric) combustion.

External Static Pressure — The total pressure loss of the system ductwork and components external to the supply fan assembly.

Factory-Installed Wiring — The wiring installed in a piece of equipment at the factory; usually the connections between the components in the control panel and the system components in the unit itself.

Fahrenheit Scale (represented as °F) — The scale of temperature measurement most commonly used in the United States.

Fan Brake Power — The actual power required to drive a fan when delivering the required volume of air through a duct system. It is greater than the power needed to deliver the air because it includes losses due to turbulence and other inefficiencies of the fan, plus bearing losses.

Fault Isolation Diagram — A troubleshooting aid usually contained in the manufacturer's Installation, Start-Up, and Service Instructions for a particular product.

Feeder — The circuit conductors between the service equipment and the branch circuit overcurrent device.

Female Thread — Any internal thread.

Field Wiring — The wiring that must be installed in the field by the installation technician.

Filter — A device used to remove dust and contaminant particles from the air.

Filter-Drier — A device in refrigeration systems that removes foreign particles and moisture from refrigerant.

Fire Damper — A damper in a duct system normally held open by a fusible link which melts at a preset temperature, allowing the damper blades to close by gravity.

Firestop — Material used to fill air passages in a frame to prevent the spread of fire.

Fish Tape — Flat, steel spring wire with hooked ends; used to pull wires through conduits or walls.

Fittings — The parts of a duct, conduit, or piping system which serve to join lengths of duct, conduit, or pipe.

Fixed-Orifice Metering Device — A device in which the metering orifice is fixed; may be a piston or capillary tube.

Flame — The zone in which the combustion reaction between a fuel gas and oxygen takes place with the intense release of light and heat.

Flame Impingement — A condition which exists when the flame of a combustion reaction comes into contact with the cooler interior surface of the combustion chamber. It causes the reaction to stop in the impingement area.

Flame Rectification — The phenomenon by which an electrical current flows through a flame; used to prove the presence of a flame.

Flare Fitting — A fitting in which one end of each tube to be joined is flared outward using a special tool. The flared tube end mates with the threaded flare fitting and is secured to the fitting with flare nuts.

Flare Nut — Connects flared copper pipe to a threaded flare fitting.

Flashing — Rust-resistant materials such as copper or aluminum that are installed at joints between roofs and walls or roofs and chimneys to prevent water from entering.

Flexible Connection — A connection using canvas, neoprene, or another soft material; used to dampen vibration and noise.

Flue Gas — Products of combustion plus excess air plus dilution air (on natural-draft appliances) that pass through the vent.

Flue — The passage that carries combustion gases from a heating system.

Flux — A substance applied to surfaces that are to be joined by soldering or brazing. It prevents oxidation during the heating process.

Follower — The sleeve on a pipe die that aligns the die with the pipe.

Forced-Air Furnace — Any furnace that uses a fan to circulate heated air.

FPM — Abbreviation for feet per minute.

Free Cooling — A mode of economizer operation. It is the cooling provided by outside air rather than the compressor.

Frequency — The number of complete cycles of an alternating current, sound wave, or vibrating object that occur in a certain period of time.

Friction — The resistance found at the duct and piping walls. Resistance creates a static pressure loss in systems.

Fuse — A safety device in which a metal link melts when it receives excessive current, thereby opening the circuit.

GA (ga) — Abbreviation for gage or gauge.

Galvanized — Protected from rusting by a coating of zinc.

Gas Valve — A device used to start, stop, or regulate the flow of gas.

Gasket — Any semihard material placed between two surfaces to make a water-tight or airtight seal when the surfaces are drawn together by bolts or other fasteners.

Gauge Manifold — A device containing compound and high-pressure gauges, with a valve arrangement to control fluid flow. Used to measure pressures and perform other service procedures in a refrigeration system.

Gauge Port — An opening or connection used to attach a gauge during service procedures.

Gauge Pressure — The pressure measured on a gauge, expressed as psig or in. Hg vac.; pressure measurements which are compared to atmospheric pressure.

GPM — Abbreviation for gallons per minute.

Grille — A louvered covering for any opening through which air passes.

Ground Fault Circuit Interrupter (GFCI) — Overcurrent device that detects minute leaks of current and then quickly deenergizes the circuit.

Ground Fault — A situation in which electricity flows outside the conductors intended to carry power; e.g., when a hot wire at a bare point touches a grounded component, such as a conduit or grounding wire.

Grounding Conductor — The wire (green or bare) in a cable that carries no current; used as a safety measure to establish a ground.

Grounding — An electrical safety practice used to prevent a person from being shocked if a tool being used has an electrical short.

HACR Circuit Breaker — A circuit breaker with a built-in trip delay commonly used in air conditioning installations due to the power surge on start-up.

Hanger — Support for pipe, conduit, or duct runs.

Hard Start Kit — A kit consisting of a start capacitor and start relay used to provide high starting torque.

Heat Anticipator — A resistive heating element in a thermostat that shuts off the furnace before the space temperature reaches the setpoint. It prevents the system from overshooting the desired temperature.

Heat Exchanger — A device which provides a means for transferring heat between two fluid streams while keeping them physically separated.

Heat Gain — The heat transferred into a structure through its outside surfaces and cracks when the outside temperature is higher than the inside temperature.

Heat Loss — The heat that is transferred out of a structure through its outside surfaces and cracks when the outside temperature is lower than the inside temperature.

Heat Pump — A comfort system in which the refrigeration cycle is reversed by a four-way valve to supply heating as well as cooling.

Heat Recovery Ventilator (HRV) — HVAC equipment that saves energy by using a heat exchanger to transfer heat from the building exhaust air to the cold ventilation air entering the building.

Heater — An electric load that converts electric energy to heat.

Heating Capacity — The rate at which a device can add heat to a substance; it is expressed in Btu/h.

Hermetic Compressor — A type of compressor in which the compressor and its drive motor are enclosed in a welded shell.

Hertz (Hz) — The unit of measure for the frequency of alternating current. One Hertz equals one cycle per second.

Hickey — A device used to bend conduit.

High Efficiency Particulate Air (HEPA) Filter — A dry-type filter in a rigid frame having a minimum particle-collection efficiency of 99.97% for 0.3 micron particles.

High-Side — The components of a refrigeration system that are under condensing pressure.

High-Voltage Circuit — The section of a wiring diagram showing distribution of primary AC power to the load devices.

Horsepower (HP) — A unit of power. One HP represents 33,000 ft. lb. of work per minute and is equal to 746 watts of electrical power.

Hot Surface Ignitor — A device that heats up when an electrical current flows through it; used to ignite gas in a gas furnace.

Hot Wires — The conductors of a circuit that are not grounded and are carrying power. Also called a *live wire*.

Humidifier — A device used to add moisture to the air.

Humidistat — An electrical control that is operated by a change in humidity.

Humidity — The moisture content of air.

HVAC — Heating, ventilating, and air conditioning.

Hydronics — Practice of heating and/or cooling with water.

Hygrometer — An instrument used to measure the degree of moisture in the air.

Hypothermia — A condition of lower-than-normal body temperature resulting from exposure to cold weather. It can result in death if left untreated.

Ignitor Pack (IGN) — A control device for gas heat that provides a voltage to operate the flame ignitor and a flame sensor to signal the gas valve to open or close.

IN. (in.) — Abbreviation for inch.

Inches Mercury Absolute (in. Hg abs.) — The scale used to measure absolute pressures equal to or below atmospheric pressure. Also used for weather reporting and forecasting.

Inches Mercury Vacuum (in. Hg vac.) — The scale used to measure gauge pressures equal to or less than atmospheric pressure.

Incomplete Combustion — Burning in which there is not enough oxygen to prevent the formation of carbon monoxide.

Indoor Coil — The designation given to the heat pump coil used to transfer heat to or from the conditioned space.

Indoor Fan Relay — An electric relay that starts and stops an indoor fan.

Induced Draft — The draft developed in the heat exchanger of a gas-fired furnace by a fan located at the outlet of the heat exchanger. May be used with a natural-draft vent, or with a direct vent system; also called *fan-assisted* or *mechanical draft*.

Induced-Draft Furnace — A furnace in which a motor-driven fan draws air from the surrounding area or from outdoors to support combustion.

Infiltration — The leakage of outside air into a structure through doors, cracks, windows, and other openings.

Inside Diameter (I.D.) — The distance between the inner walls of a pipe; used as the standard measure for tubing used in heating and plumbing applications.

Installation Diagram — A diagram that shows little internal wiring but gives specific information as to terminals, wire sizes, color coding, and breaker or circuit sizes.

Insulation (Electrical) — Nonconducting materials used to cover wires and in the construction of electrical devices.

Insulator — A device that inhibits the flow of current; opposite of a conductor.

Isolation Transformer — A transformer with a one-to-one turns ratio. It is used for safety and to prevent electrical interference.

Jig — Any type of fixture designed to hold pieces or guide tools while work is being performed.

Journal — The part of a shaft, axle, spindle, etc., which is supported by and revolves in a bearing.

Jumper — A length of wire used to connect a portion of an electrical circuit.

Junction Box — A box in which connections between circuit conductors are made. A junction box is not an outlet, since no load is fed from it directly.

K Grade Copper Pipe — Copper pipe suitable for installation underground.

Knockout — A die-cut impression in electrical boxes and enclosures designed so that it can readily be removed to provide an opening for access.

KW (kW) — Abbreviation for kilowatt.

L Grade Copper Pipe — A type of copper pipe used to convey water above ground.

Label Diagram — A diagram usually placed in a convenient location inside HVAC equipment. It normally depicts a wiring diagram, a component arrangement diagram, a legend, and notes pertaining to the equipment.

Ladder Diagram — A simplified method for portraying an electrical diagram.

Lay Out — The act of measuring and marking the location of something.

Legend — An explanation of the component abbreviations on a diagram.

Light Emitting Diode (LED) — A semiconductor component that produces light when a current passes through it.

Limit Switch — A protective device used to open or close electrical circuits when temperature or pressure limits are reached.

Line Drop — The voltage drop due to resistance in an electrical conductor.

Line Duty Device — A protective device that opens the motor winding circuit under conditions of excess current or temperature.

Line Side — The side of a device electrically closest to the source of current.

Line Voltage — The voltage being supplied to the equipment at the power supply.

Liquid Sightglass — The glass-ported fitting in the liquid line used to indicate adequate refrigerant charge. When bubbles appear in the glass, there is insufficient refrigerant in the system.

Liquid Solenoid Valve — An electrically-operated automatic shutoff valve in the liquid piping that closes on system shutdown to prevent refrigerant migration.

Load Side — The side of a device electrically farthest from the current source.

Load — A device that converts electrical energy into another form of energy (heat, mechanical motion, light, etc.). Motors are the most common loads in HVAC systems.

Louver — An opening for ventilation consisting of horizontal slats installed at an angle to allow the passage of air, but exclude rain, light, and vision.

Low-Side — The components of a refrigeration system that are under evaporating pressure.

Low-Voltage Circuit — The control circuit portion of a wiring diagram, termed "low voltage" because it generally operates from a stepped-down voltage.

LPG (LP Gas) — An acronym for Liquefied Petroleum Gas; refers to those fuel gases that remain a liquid under pressure, including propane and butane.

Lugs — Terminals on the ends of a wire or built into electrical devices for the purpose of making connections.

Magnetic Overload Device — A protective device that disconnects a circuit when excessive current creates a magnetic field sufficient to open the contact. Magnetic overload devices are not affected by the ambient temperature.

Main — The main circuit that supplies all other circuits; also called the *main disconnect*.

Male Thread — Threads on the outside of a pipe, fitting, or valve.

Malleable Iron — Cast iron that has been heat treated to reduce its brittleness. Pipe fittings are made from malleable iron.

Manometer — An instrument used to measure low positive, negative, or differential air and gas pressures.

Mastic — A thick adhesive.

Mechanical Cooling — A mode of economizer operation. It is the cooling provided in the conventional manner by the compressor.

Metering Device — A component of a refrigeration system that controls the flow of high-pressure liquid into the evaporator.

Microfarad (MFD) — One-millionth of a Farad; the standard unit of measurement for a capacitor.

Microprocessor — A micro-computer chip consisting of integrated circuits which accept, store, and process information and control output devices.

Milliamp — A unit of electric current equal to 1/1,000 of an ampere.

Motor — A device used to convert electrical energy into mechanical energy.

Multimeter — A combination meter used to measure voltage, current, and resistance.

National Electrical Code® (NEC®) — A nationally-recognized standard that establishes the minimum installation requirements for electrical systems in the United States. It is published by the National Fire Protection Association (NFPA).

Natural Draft — The draft developed in a chimney or vent of a gas-fired appliance by the difference in density of the hot flue gas and the outside atmosphere caused by their temperature difference.

Natural-Draft Furnace — A furnace in which the natural flow of air from around the furnace provides the air to support combustion. It also depends on the pressure created by the heat in the flue gases to force them out through the vent system.

Natural Gas — A naturally occurring fuel gas composed of about 95% methane gas with other gases, such as ethane, hydrogen, carbon dioxide, and nitrogen making up the remainder.

Negative Temperature Coefficient (NTC) Thermistor — A sensing element in which the resistance decreases as the temperature increases. NTC thermistors are used as temperature sensors and as protective devices in motors.

Neutral Wire — The conductor in a cable that is kept at zero voltage. All current that flows through the hot wire must also flow through the neutral wire.

NFPA — National Fire Protection Association.

Nipples — Short lengths of pipe (usually less than 12 inches) with male threads on both ends; used to join fittings.

Normally Closed Contacts — Contacts that close when a relay or contactor is deenergized.

Normally Open Contacts — Contacts that open when a relay or contactor is deenergized.

O-Ring — A rubber seal used around pipe flanges and stems of some valves to prevent water leakage.

OC (On Center) — The distance from the center of one structural member to the center of the next structural member.

Occupational Health and Safety Administration (OSHA) — A department of the U.S. government concerned with occupational safety.

Ohm — A unit of electrical resistance.

Oil (Refrigeration) — A specially-formulated compressor lubricating oil used in refrigeration systems.

One Hundred Percent Shutoff Valve — An automatic valve that shuts off all gas to the pilot and prevents gas valve operation if the pilot is extinguished.

Open Circuit — An electric circuit with a physical break in the path (caused by opening a switch, disconnecting a wire, burning out a fuse, etc.) through which no current can flow.

Orifice — A calibrated hole used to measure or control the flow of a fluid; e.g., a gas orifice is a precision-drilled hole in a spud that is used to control the flow of gas to a burner.

Outdoor Coil – The heat pump coil used to transfer heat to or from the outdoor air.

Outlet Box – A box used to terminate a cable or conduit. Connections are made in the box. A variety of covers and plates are available to close the box.

Outside Diameter (O.D.) – The distance between the outer walls of a pipe; used as the standard measure for ACR tubing.

Overcurrent Protection Device – A fuse or circuit breaker that is used to prevent an excessive flow of current.

Overload – Current demand exceeding that for which the circuit or equipment was designed.

Overload Protector – A device operated by current that shuts the system off when limits are exceeded.

Oxidation – The process by which the oxygen in the air combines with metal to produce tarnish and rust.

Packaged Unit – A self-contained heating and/or air conditioning system.

Packing – A loosely-packed waterproof material installed in the packing box of valves to prevent leaking around the stem.

Penny – Measure of nail length. Abbreviated as "d."

Phillips Head – A type of screw head with a cross-slot.

Pilot – A small flame that is utilized to ignite the gas at the main burner(s) of a gas-fired device.

Pilot Duty Device – A protective device that opens the motor control circuit under conditions of excess current or temperature.

Pilot Hole – A small hole drilled to receive the threaded portion of a wood screw.

Pipe Joint Compound – Putty-like material used for sealing threaded pipe joints; commonly called *pipe dope*.

Piping – A generic term used to refer to all the pipes in a building.

Pitch – The degree of slope or grade given a horizontal run of pipe.

Pitot Tube – A tube used with manometers and differential pressure gauges to measure air velocities and static pressures.

Plenum – A sealed chamber at the inlet or outlet of an air handler. The duct attaches to the plenum.

Plug – A pipe fitting with external threads and head that is used for closing the opening in another fitting.

Plumb – Exactly vertical; at a right angle to the horizontal.

Plumb Bob – A pointed weight attached to a line for testing plumbness.

Pneumatic – Operated by air pressure.

Polarized Plug – A plug whose prongs are designed to enter a receptacle in only one orientation.

Polarizing – Using color to identify wires throughout a system to ensure that hot wires will be connected only to hot wires and that neutral wires will run back to the ground terminals in continuous circuits.

Pole – One set of electric contacts either in an automatic device or a manual switch. Electric devices such as relays, contactors, switches, and breakers can be purchased with one or many poles.

Polyethylene – Plastic used to make pipe and fittings primarily for gas piping. Also, a plastic sheet material used in the building trade as a vapor barrier and to protect building materials from poor weather during construction.

Positive Temperature Coefficient (PTC) Thermistor – A sensing element in which the resistance increases as the temperature increases. PTC thermistors are used as temperature sensors and as start assist devices for motors.

Pounds per Square Inch Absolute (psia) – The scale used to measure absolute pressures.

Pounds per Square Inch Gauge (psig) – The scale used to measure gauge pressures.

Power – The amount of energy consumed by a load in an electrical circuit.

Power Supply – The voltage and current source for an electrical circuit. A battery, utility device, and transformer are power supplies.

Pressure – Force per unit of area.

Pressure Drop – The pressure difference between two points.

Pressurestat – A pressure switch often used as a protective device for compressors. A bellows or diaphragm in the switch responds to pressure changes, breaking the circuit if the pressure goes beyond a set value.

Primary Air – Combustion air that is mixed with gas in a burner before leaving the port.

Printed Circuit Board – A support for electronic circuits that generally consists of electrical components linked by chemically etched (pre-printed) copper foil conductors.

Propane – A member of the methane family of hydrocarbons; used as a fuel gas.

Psychrometer – An instrument used to measure the relative humidity of the air.

Psychrometric Chart – A chart that displays the relationships of air temperature, pressure, and humidity.

Pull Box – A box inserted into a conduit run for the purpose of providing a cable pulling point. Cable may be spliced in these boxes.

Punch List – A list made by the builder or owner of a structure near the end of construction; it indicates what must be done before the structure is completely finished and ready for occupancy.

Purging – Releasing compressed gas to the atmosphere through some part or parts, such as a hose or pipeline, for the purpose of removing contaminants from that part or parts.

PVC (Polyvinyl Chloride) – A type of plastic used to make plumbing pipe and fittings for water distribution, irrigation, and natural gas distribution.

R-Value – The thermal resistance of a given thickness of insulating material.

Raceway – A protected runway or enclosure for holding conductors or cables; e.g., conduit, conduit bodies, or cable trays.

Radial Load – The side or radial force applied at right angles to a bearing and shaft.

Re-ignition Pilot – A pilot that is equipped with a device to re-light the pilot gas, either when the pilot is extinguished or, on furnaces with 100% shutoff valves, each time the furnace is turned on.

Reaming – Removing the burr from the inside of a pipe that has been cut with a pipe cutter.

Reducer – A pipe fitting having one opening smaller than the other. Reducers are used to change from a relatively large diameter pipe to a smaller one. In duct systems, it is a fitting larger on one end than on the other end used to change from one size duct to another.

Redundant Gas Valve – A gas control containing two gas valves in series. If one fails, the other is available to shut off the gas when needed.

Refrigerant – A fluid (liquid or gas) that picks up heat by evaporating at a low temperature and pressure. It gives up heat by condensing at a higher temperature and pressure.

Refrigerant Reclaim – The reprocessing of refrigerant to new refrigerant specifications. This requires chemical analysis and usually refers to the processes available at a reprocessing or manufacturing facility.

Refrigerant Recovery – The removal of refrigerant from a system and placement in a cylinder without testing.

Refrigerant Recycling — The cleaning of refrigerant for reuse by removing moisture, acids, and particulate matter. Usually applies to procedures performed at the job site or local service shop. The cleaned refrigerant does not meet new refrigerant specifications.

Register — An air grille equipped with a damper or control valve.

Relative Humidity — The ratio of the amount of vapor contained in the air to the greatest amount the air could hold at that temperature. Normally expressed as a percentage.

Relay — A magnetically operated device consisting of a coil and one or more sets of contacts used to connect or disconnect a load.

Resistance — The ability of a device or material to obstruct the current flow within a circuit.

Resistive Circuit — Any circuit that contains at least one resistive load.

Resistor — A device or material that impedes the current flow within a circuit.

Return Air — Air leaving the conditioned space and returning to the air conditioning equipment.

Reverse Cycle Heat — The heat produced by a heat pump when refrigerant flow is reversed from the cooling mode to the heating mode.

Reversing Valve — A valve that changes the direction of refrigerant flow in a heat pump.

Revolutions per Minute (RPM) — The speed at which a device is rotating.

Rigid Copper Tubing — Hard copper pipe used when installing refrigerant or water lines.

Rip — Sawing lumber in the direction of the grain.

Riser Diagram — A schematic depicting the layout, components, and connections of a piping system.

Riser — A vertical supply pipe extending from a horizontal supply pipe to a fixture or device.

Rollout Switch — A heat-sensitive protective device that opens the circuit if flame migrates away from the burner box.

Romex® — A trademark for one brand of NM cable (nonmetallic-sheathed cable) used for indoor wiring.

Rooftop Unit — A heating and/or cooling unit that conditions a structure; it is mounted on the roof after adequate reinforcement has been built into the roof.

Run — One or more lengths of pipe that continue in a straight line.

Run Capacitor — An electrical storage device that helps motors run more efficiently.

Run-Down Resistance — The torque required to overcome the resistance of associated hardware, such as locknuts and washers, when tightening a fastener.

Safety Pilot — A pilot light with a flame sensing element.

Saturation Temperature — The boiling point of a refrigerant. It is dependent upon pressure.

Schedules — Tables on construction drawings that describe and specify the types and sizes of items required for the construction of a building.

Schematic Diagram — A diagram that lays out the control system circuit by circuit and is composed of symbols representing components and lines representing their interconnecting wiring.

Schrader Valve — A spring-loaded device similar to a tire valve that allows refrigerant to be added to or removed from the system.

Seasonal Energy Efficiency Ratio (SEER) — The total cooling of an air conditioner or heat pump in Btu's during its normal annual usage period for cooling divided by the total electrical energy input in watt-hours during the same period.

Seasonal Performance Factor (SPF) — A heat pump performance rating that has been adjusted for seasonal operation.

Secondary Air — Combustion air that mixes with the burning gas-primary air mixture in the flame zone.

Semi-Hermetic Compressor — A hermetic (airtight) compressor that can be opened or disassembled by removing bolts and flanges. Also known as a *serviceable hermetic*.

Sequencer — A relay with a built-in time delay of a few seconds that allows electric heating elements to be gradually staged on.

Service Conductors — Electrical conductors that extend from the street main or transformer to the service equipment of the building being supplied with power.

Service Equipment — Electrical equipment located near the entrance of supply conductors that provides main control and enables cutoff (via fuses or circuit breakers) for the supply of current to the building.

Service Panel — The main panel through which electricity is brought from an outside source into a building and distributed to the branch circuits.

Set or Seizure — In the last stages of rotation in reaching the final torque of a nut or bolt, seizing or set of the fastener may occur. This is usually accompanied by a noticeable popping effect.

Setpoint — A preset temperature at which a temperature-sensitive switch will open or close.

Shank Hole — A hole drilled for the thicker portion of a wood screw.

Shim — A thin, wedge-shaped piece of material used behind pieces for the purpose of straightening them, or for bringing their surfaces flush at a joint.

Short Circuit — Conducting current, accidental or intentional, between any of the conductors of an electrical system. This connection may be from line to line or line to neutral (ground).

Short-Cycling — A condition in which a compressor or furnace is restarted immediately after it has been turned off.

SI (International System of Units) — Includes the common metric units of measure, such as meters, grams, Celsius, Kelvin, and pascals.

Sightglass — A glass tube or window in a liquid line. It shows the refrigerant or oil in the system and indicates the presence of gas bubbles in the liquid line.

Single-Phase Voltage — The potential difference produced by a single conductor output from a generating source. Single-phase voltage produces a single waveform.

Sleeve — A metal form providing a clear opening in concrete for duct or pipe.

Sling Psychrometer — A device with wet and dry bulb thermometers that is whirled rapidly in the air to measure sensible wet and dry bulb temperatures.

Slow Blow Fuse — A fuse with a built-in trip delay commonly used in HVAC installations due to the power surge on start-up.

SMACNA — Sheet Metal and Air Conditioning Contractors National Association, Inc.

Solder — A fusible alloy used to join metals.

Soldering — The process of joining two metals by using a third metal, a filler, with a melting temperature of less than 800° F.

Soldering Iron — A tool used to melt solder when joining pieces of metal.

Solenoid — A magnetic device that is used to convert electrical energy into mechanical energy. Many valves are solenoid-activated.

Specific Gravity — Of a gas, the ratio of the weight of a given volume of the gas to the weight of the same volume of standard air (i.e., air at standard temperature and pressure); for a liquid or solid, the ratio of the weight of a given volume of the substance to the weight of the same volume of water at 4° C.

Specific Heat — The amount of heat required to raise one pound of a substance 1° F; expressed in Btu/lb./°F.

Specification — A document that describes the quality of the materials and the work required. Specifications list the types of tubing, fixtures, hangers, etc. to be used on a project.

Splice — A connection made by joining two or more wires.

Split System — A refrigeration or air conditioning system in which the condenser and evaporator are in separate locations, joined by refrigerant piping.

Splitter — A hinged sheet of metal used to divert air into a branch duct.

Spread — The divergence of the airstream in a horizontal or vertical plane after it leaves the outlet.

Spud — A threaded metal device that screws into the gas manifold. It contains the orifice that meters gas to the burners.

SQ. (sq.) — Abbreviation for square.

SQ. FT. (sq. ft.) — Abbreviation for square foot or feet.

SQ. IN. (sq. in.) — Abbreviation for square inch or inches.

Staged System — A system that has more than one stage of heating or cooling operation.

Staging Thermostat — A thermostat that is designed to open and close more than one set of contacts to control several stages of heating or cooling operation.

Standing Pilot — A gas pilot that is on continuously.

Start Capacitor — An electric storage device that helps to overcome motor starting torque.

Static Pressure — The pressure exerted by a fluid at rest; for a flowing fluid, as air in a duct, it is the total pressure minus the velocity pressure.

Subbase — The portion of a two-part thermostat that contains the wiring terminals and control switches.

Subcooled Liquid — A liquid at a temperature below the saturation temperature of the substance.

Suction Side — The low-pressure side of a refrigeration system, extending from the metering device through the evaporator to the inlet valve of the compressor.

Superheated Gas — A gas at a temperature above the saturation temperature of the substance.

Supply Air — Air that has been treated at the conditioning device for distribution to the conditioned space.

Swaging — Enlarging one end of a tube using a special tool so that another tube of the same size can fit within it in preparation for making a solder or bronze connection.

Sweating — A method of joining pipe in which solder is applied to the joint and heated until it flows into the joint.

Switch — A device used to connect and disconnect the flow of current or to divert current from one circuit to another.

T or T Fitting — A fitting shaped like the letter "T." Each leg of the T can be joined to a pipe, duct, or another fitting.

Takeoff — (1) The process of surveying, measuring, itemizing, and counting all materials and equipment needed for a construction project, as indicated by the drawings. (2) A duct fitting used to make the transition between a main duct and a branch duct.

Temperature — The measure of the intensity of heat that a substance possesses.

Temperature Rise — The positive change in temperature of air passing through a heat exchanger as a result of heat transfer.

Tempered — Metal that is treated in a special way to be harder and stronger.

Template — A pattern or guide for cutting or drilling.

Terminal — A point on an electrical device where connections may be made.

Thermal Overload Device — A bimetal protective device that acts as a switch contact, disconnecting the circuit under conditions of excessive heat.

Thermocouple — A device comprised of two dissimilar metals that generates an electrical potential in the presence of heat.

Thermometer — A device used to measure temperature.

Thermostat — A device that connects or disconnects a circuit in response to a change in the ambient temperature.

Thermostat Body — The portion of a two-part thermostat that contains the heating and cooling thermostats.

Thermostatic Expansion Valve (TEV or TXV) — A valve used to control superheat in a refrigeration system by regulating the flow of liquid refrigerant to the evaporator.

Three-Phase Voltage — The potential difference produced by three conductors spaced 120° apart in a generating source. Three-phase voltage produces three waveforms, each out of sync with the others by one third of a cycle.

Throw — The horizontal or vertical axial distance an airstream travels after leaving an air outlet before the maximum stream velocity is reduced to a specific terminal level as specified by the outlet device manufacturer; e.g., 200, 150, 100, or 50 FPM.

Thrust — The force acting lengthwise along the axis of a shaft, either toward it or away from it.

Time Delay Relay — A relay in which there is a delay between the time the coil is energized or deenergized and when the contacts open or close. Often used to control fans for greater heating or cooling efficiency.

Tolerance — The amount of variation allowed from a standard.

Ton — The basic large unit for measuring the rate of heat transfer (12,000 Btu/h).

Torque — The force that must be generated to turn a motor. Also, the resistance to turning or twisting.

Total Cooling Load (Expressed in Btu/h or tons) — The rate at which total heat enters a space.

Total Pressure — The sum of the static pressure and the velocity pressure in an air duct. It is the pressure produced by the fan or blower.

Transformer — A device used to raise and lower AC voltage levels.

Transition — A duct fitting that changes from one geometric shape to another, as square to round.

Troubleshooting Table — A troubleshooting aid usually contained in the manufacturer's Installation, Start-Up, and Service Instructions for a particular product. Troubleshooting tables are intended to guide the technician to a corrective action based on observations of system operation.

Tubing — Thin-wall pipe that can be easily bent.

Turning Vanes — A series of small radius blades evenly spaced along the diagonal, parallel to the turn of a duct elbow.

Union — A fitting used to join two lengths of pipe. It permits disconnecting the two pieces of pipe without cutting.

Vacuum — Any pressure below atmospheric pressure.

Vacuum Pump — A pump used to remove air and moisture from a refrigeration system at a pressure below atmospheric pressure.

Vapor Barrier — A moisture-impervious layer applied to the surfaces enclosing a humid space to prevent moisture travel to a point where it may condense due to lower temperature.

Velocity — How fast air is moving; usually measured in feet per minute.

Velocity Pressure — The pressure in a duct due to the movement of the air. It is the difference between the total pressure and the static pressure.

Velometer — An instrument that measures the velocity of air or water.

Vent — A passageway used to convey flue gases from gas-burning equipment to the outside atmosphere.

Vent Connector — A pipe or duct which connects a gas-burning appliance to a vent or chimney.

Vent Damper — A device intended for installation in the venting system at the outlet or downstream of a gas-burning appliance to automatically open the vent when the appliance is in operation and to automatically close off the vent when the appliance is off.

Ventilation — The process of supplying or removing air, by natural or mechanical means, to or from any space. Such air may or may not have been conditioned.

Venturi — The flared-shape portion of a burner nearest the gas orifice that is designed to assist the gas jet in injecting air into the burner. Also a ring or panel surrounding the blades of a propeller fan used to improve fan performance.

Volt — A unit of electrical potential.

Voltage — An electrical measurement of the potential for electron flow within a circuit.

Voltage Drop — The amount of voltage required for a single load in a circuit.

Volume — The amount of air in cubic feet flowing past a given point in one minute (measured in CFM).

Watt — A unit of electrical power.

Wet Bulb — A device used to measure relative humidity. Evaporation of moisture lowers the temperature of the wet bulb compared to the dry bulb temperature of the same air sample.

Wet Bulb Temperature — A measure of humidity in the air.

Wetting — A process that reduces the surface tension so that molten (liquid) solder flows evenly throughout a joint.

Wire Gauge — A standard numerical method of specifying the physical size of a conductor. The American Wire Gauge (AWG) series is the most common.

Wire Nut — A solderless connector for joining wires.

Wiring Diagram — Also known as a *wiring schematic*, a wiring diagram is that portion of a label diagram which illustrates the internal wiring of the unit.

Zone Damper — A damper used to control airflow to a zone in a zoned comfort system.

Zone Valve — A thermostat-controlled valve used in hydronic heating and cooling systems to control the temperature in a certain area or zone.

Zoning — The practice of providing independent heating and/or cooling to different areas in a structure.

