



Glossary of Air Compressor Terms

Absolute Pressure – The arithmetic sum of gauge and atmospheric pressures. It must be used in all calculations involving the basic gas laws.

Absolute Temperature – The temperature of a body referred to the absolute zero. On the Fahrenheit scale this is minus 459.67°; on the centigrade scale it is minus 273.15°C. Engineering values of minus 460°F and minus 273°C are used herein.

Adiabatic Compression – A process during which no heat is added or removed from the gas.

Aftercooling – Involves cooling of gas in a heat exchanger following the completion of compression to (1) reduce the temperature and (2) liquefy condensable vapors.

Altitude – Elevation above sea level.

Atmospheric Air – Consists of individual molecules of oxygen and nitrogen. They strike enclosing surfaces and produce pressure. May also contain contaminants.

Axial Flow Compressors – Accelerate air in a direction generally parallel to the shaft, units resemble turbines; each pair of moving and stationary blade-rows form a stage. Pressure rise per stage is relatively small.

Barometric Pressure – The absolute atmospheric pressure existing at the surface of the earth. Is the weight of a unit column of air above the point of measurements. It varies with altitude and, at any given location, with moisture content and weather.

Capacity – The quantity of gas actually delivered while operating between specified inlet and discharge pressure. Capacity is a volume measured at the conditions of pressure, temperature, gas composition and moisture content existing at the compressor inlet flange.

Centrifugal Compressor – Usually takes in air at impeller center and accelerates it radially. Some static pressure rise occurs in impeller, but most is in diffuser section of casing, where velocity converts to static pressure.

Clearance – That volume contained in one end of the cylinder which is not swept by the movement of the piston. It includes space between piston and head at the end of the compression stroke, space under the valves, etc., and is expressed as a percentage of the piston displacement per stroke. Clearance may be different for the two ends of a double acting cylinder. And average generally is used.

Compressibility – That property of a gas or a gas mixture that causes it to differ in volume from that of perfect gas when each is under the same pressure and temperature conditions.

Compression Efficiency – The ratio of the theoretical work requirement (using a stated process) to the actual work required to be done on a gas. Efficiency accounts for leakage and fluid friction losses, and thermodynamic variations from the theoretical process.

Compression Ratio – The ratio of the absolute discharge to the absolute intake pressure. It usually applies to a single stage of compression, but may be applied to a multistage compressor as well.

Design (Built-In) Compression Ratio – Refers to the compression ratio that has been attained when fixed discharge port is uncovered.

Dew Point – The temperature at which the vapor in a space (at given pressure) will start to condense (form dew). Dew point of a gas mixture is the temperature at which the highest boiling point constituent will start to condense.

Discharge Pressure – The total gas pressure (static plus velocity) at the discharge flange of the compressor. Velocity pressure usually is considered only with dynamic pressure.

Discharge Temperature – The temperature existing at the discharge flange of the compressor.

Displacement – Applies only to positive-displacement compressors. It is the net volume swept by the moving parts in a unit of time, usually one minute.

Dry Bulb Temperature – The ambient gas temperature.

Dry Gas – Any gas or gas mixture that contains no water vapor and/or in which all of the constituents are substantially above their respective saturated vapor pressures at the existing temperature. (*See Wet Gas*)

Free Air – Air at atmospheric conditions at any specific location. since altitude, barometer and temperature may vary, this term does not mean air under uniform or standard condition.

Gauge Pressure – Pressure as determined by most instruments and gauges. Barometric pressure must be allowed for to obtain the true or absolute pressure.

Heat – Energy transferred because of a temperature difference. There is no transfer of mass.

Humidity – Has to do with the moisture (water vapor) in the atmosphere. There are two engineering terms involved:

Relative Humidity – The ratio of the actual partial vapor pressure in an air-vapor mixture to the saturated vapor pressure at the existing dry-bulb mixture, usually expressed in percent.

Specific Humidity – The ratio of weight of water vapor in an air-vapor mixture to the weight of dry air. It is usually expressed as pounds of vapor per pound of dry air.

Ideal Gas – Follows the perfect gas laws without deviation. Practically, there is no such thing, but it is the basis from which calculations are made and corrections applied.

Inert Gas – One that does not enter into known chemical combination with either itself or another element. There are four known gases of this type: helium, neon, argon, and krypton. To the engineer, however, the term usually means a gas that does not supply any of the needs of combustion.

Inlet Temperature – The temperature at the inlet flange of the compressor.

Intercooling – Involves the cooling of gas between stages of compression (1) to reduce the temperature, (2) to reduce the volume to be compressed in the succeeding stage, (3) to liquefy condensable vapors, and (4) to save power.

Isentropic Compression – A reversible adiabatic compression. During isentropic compression the pressure, volume and temperature of the gas all vary.

Isothermal Compression – A process during which the temperature of the gas is held constant. As it requires continuous removal of heat during compression, this process is not practical. Isothermal formulas are of little use except on theoretical applications.

Normal air – Term used for average atmospheric air at sea level in a temperature zone where it contains some moisture. It is defined in the ASME Test Code for Displacement Compressors as being at 14.696 psia, 68°F., 36% relative humidity and weighing 0.075 lb/cu ft. The value is 1.395.

Perfect Intercooling – Obtained when the gas is cooled to first stage inlet temperature following each stage of compression.

Piston Displacement – The net volume displaced by the piston at rated machine speed, generally expressed in cfm. For single-action double-acting cylinders it is the total of both ends. For multistage compressors, the displacement of the first stage only is commonly stated as that of the entire machine.

Polytropic Compression – Process during which change in gas characteristics are considered. This is the normal compression cycle of dynamic units.

Psychometry – Has to do with the properties of air-water vapor mixtures in the atmosphere.

Receivers – Reservoirs for the compressed air.

Reciprocating Compressors – Suck air into cylinders through valves, during the suction stroke. At the end of discharge stroke, air leaves at higher pressure. Separate valves are provided for inlet and outlet.

Rotary Compressors – Includes screw, lobe and vane Compressors, as well as blowers.

Separators – Generally used between aftercooling and receiver. They are also used in branch lines where there is danger of condensation, or where tools or devices served need protection of an additional separator.

Silencers – Reduce compressor inlet or discharge noise.

Sliding-Vane Rotary – Traps air between vanes as rotor passes inlet opening. As rotor turns toward discharge port, volume of cell between and two vanes decrease. This causes air pressure to rise to rated discharge value. Vanes slide in and out of slots as rotor turns, are held against casing by centrifugal force.

Specific Gravity – The ratio of the density of a given gas to the density of dry air, both measured at the same specified conditions of temperature and pressure, usually 14.696 psia and 60°F. It should also take into account any compressibility deviation from a perfect gas.

Specific Heat – The rate of change in Enthalpy with temperature. It is commonly measured at constant pressure or at constant volume. The values are different and are known as c_p and c_v respectively.

Specific Volume – The volume of a given weight of gas, usually expressed as cu ft/lb at SPT conditions.

Staging – An arrangement of compressor elements to raise the gas pressure in separate steps. Two or more stages may be used and each stage is basically a separate compressor.

Stand Pressure and Temperature (SPT) – 14.696 pisa and 60° F. unless specifically stated otherwise.

Superheated Air-Vapor Mixture – One on which the space occupied by the mixture is above the saturation temperature at the mixture temperature.

Temperature – The property of a substance that gauges the potential or driving force for the flow of heat.

Two-Lobe Rotary – Has identical impellers held in a fixed relationship to each other by external gears. When impellers rotate, each traps air between its outer surface and the casing. When impeller upper tip passes top edge of casing it permits discharge to begin. Bottom tip of impeller pushed enclosed air into discharge piping, compressing it against the backpressure (Roots Blower).

Volumetric Efficiency – The ratio in percent of the actual delivered capacity (measured at inlet temperature, pressure and gas composition) to the piston displacement.

Wet Bulb Temperature – Used in psychrometry and is the temperature recorded by a thermometer whose bulb has been covered with a wetted wick and whirled on a sling psychrometer. Taken with the dry bulb, it permits determination of the relative humidity of the atmosphere.

Wet Gas – Any gas or gas mixture in which one or more of the constituents is at its saturated vapor pressure. The constituent at saturation pressure may or may not be water vapor.

Work – Energy in transition and is defined in units of force times distance. Work cannot be done unless there is movement.