

# TECHNICAL BULLETIN

## COMPRESSED AIR & GAS TERMINOLOGY

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### **ABSOLUTE MICRON RATING**

A filter rating that requires that ALL (not just 98%) particles larger than the indicated micron size have been removed from the fluid being filtered.

### **ABSOLUTE PRESSURE:**

Is the actual gauge pressure added to the atmospheric or barometric pressure at a specific elevation. The absolute pressure at sea level will be the gauge pressure plus 14.7 PSIA.

### **ABSORB:**

Is the taking up of one substance by another. In compressed air drying condensation is absorbed by calcium chloride pellets and then form a solution.

### **ACTUAL CAPACITY:**

The volume of air compressed and delivered at a specific discharge pressure. Generally, it is expressed in cubic feet per minute.

### **ACTUATOR:**

A pneumatic powered or electrically powered device that supplies force and motion to open or close a valve.

### **ADIABATIC COMPRESSION:**

Occurs when no heat escapes and the temperature of the air or gas rises.

### **ADJUSTABLE SPEED:**

The concept of varying the speed of a compressor or blower to vary the capacity.

### **ADJUSTABLE SPEED DRIVE (ELECTRICAL):**

The adjustable speed drive is comprised of the motor, drive controller and operator's controls (either manual or automatic).

### **ADSORB:**

Refers to the adhering of molecules of a liquid to the surface of a porous solid.

### **AERATION:**

To combine or charge with gas.

### **AIR ACTUATOR:**

An elastomeric bellow with specially designed metal end closures used in place of pneumatic or hydraulic cylinders. A device that uses compressed air as a medium to cause action or motion through which the power is transmitted.

**AIR AMPLIFIER:**

A component on a compressed air line designed to increase in magnitude the flow by releasing small amounts of compressed air at high velocity through an internal, ring shaped nozzle. This column of air released through the front creates a vacuum behind, thus pulling ambient air through the rear and pushing ambient air in front.

**AFTERCoolERS:**

Is either an air or water-cooled heat exchanger used to remove the heat of compression following the final stage of compression.

**AIR COOLED COMPRESSOR:**

A compressor cooled by blowing atmospheric air around the cylinders and heads to dissipate heat. These units normally have deep fins cast into the cylinders and heads to provide maximum area for better cooling.

**AIR CURTAIN/AIR KNIFE:**

A component on a compressed air line that provides wide area coverage with a thin sheet of air. Also reduces noise and amplifies compressed air flow.

**AIR INTAKE FILTER:**

A device for separating and removing fine particles of dust and dirt before it enters the compressor.

**AIR MOTOR:**

A compact, low mass motor providing smooth, non-vibrating power. Examples are vane, piston, percussion and turbine motors.

**AIR NOZZLE:**

An attachment at the end of a tube or pipe which compressed air exits. It will reduce the compressor demand by increasing the thrust and volume for the least possible air consumption.

**AIR RECEIVER:**

Vessel used to store air under pressure.

**AIR RETURN:**

When a pneumatic control valve returns to its normal (unactuated) state by means of air.

**AIR-TO-CLOSE:**

When the application of air pressure to an actuator is required to cause the valve to close. This is another way of saying the valve is Fail Open or Normally Open.

**AIR-TO-OPEN:**

When the application of air pressure to an actuator is required to cause the valve to open. This is another way of saying the valve is Fail Closed or Normally Closed.

**ALTITUDE:**

The elevation of a compressor above sea level.

**AMBIENT TEMPERATURE:**

The temperature of the surrounding cooling medium (room temperature, outside temperature etc.)

**ARMATURE:**

Rotating element of a d-c machine requiring commutator.

**ATMOSPHERIC DEW POINT:**

The dew point of air at atmospheric pressure.

**ATMOSPHERIC PRESSURE:**

The air in which we live is always under pressure. This pressure decreases as we ascend to higher altitudes and increases as we descend down to sea level.

At sea level the pressure of the air (called, absolute pressure) is about 14.7 pounds per square inch, that is, the air presses on each square inch with a pressure of 14.7 pounds. At 1000 feet above sea level the

atmospheric pressure has decreased to about 14.2 pounds per square inch. Atmospheric the air pressure varies about .5 PSI for each 1000 feet in altitude.

This pressure of the air is not constant but varies from hour to hour depending upon the atmospheric conditions and the weather.

**AUDIT:**

A survey which shows how much energy is being used by your compressor system and suggest ways to use energy more efficiently.

**AUTOMATIC CONDENSATE DRAIN:**

A device designed to automatically eject any accumulation of water from the compressed air system.

**AXIAL COMPRESSOR:**

An aerodynamic compressor usually multistage. The air is drawn through a series of rotors and stators until the desired working pressure is achieved. It is called axial because the air essentially enters one end of the compressor and is ejected at pressure from the other end.

**BAR:**

A measurement of pressure, 100kPa = 1 bar. This corresponds very closely to 1 atmosphere and the two are often confused. 1 bar = 14.504 psi 1 atmosphere = 14.7 psi

**BARAMETRIC PRESSURE:**

The atmospheric pressure at the surface of the earth. It is the weight of a unit column of air above the point of measurement. It varies with altitude and at any given location, with moisture content and weather.

**BASE PLATE:**

The mounting structure that the compressor sits on.

**BEARING (BALL):**

A "ball" shaped component that is used to reduce friction and wear while supporting rotating elements. For a compressor, this type of bearing provides a relatively rigid support for the output shaft.

**BEARING (ROLLER):**

A special bearing system with cylindrical rollers capable of handling belted load applications that are too large for standard ball bearings.

**BELT-DRIVE COMPRESSOR:**

A compressor with the motor drive force supplied by a belt. A pulley is attached to the compressor shaft. The ratios of the diameters of the compressor and motor pulleys defines the rotational speed of the compressor.

**BIMETALLIC THERMOMETER:**

A strip of two metals having different coefficients of expansion, bonded together usually in the form of a spiral or strip. Movement of the bonded metals caused by a temperature change becomes a measure of temperature.

**BLOWER:**

A compressor that is designed to operate at lower pressures. Usually a blower is an air compressor that operates below 12 - 15 PSIG although this figure is quite loose and depends upon the respective manufacturer.

**BOOSTER COMPRESSORS:**

A machine for compressing air or gas from an initial pressure, which is already above atmospheric pressure, to an even higher pressure.

**BRAKE HORSEPOWER:**

Refers to the amount of power that is available from the drive shaft of the electric motor or other driver connected to the compressor.

**BREAKDOWN TORQUE:**

Maximum torque a motor will produce; often referred to as Pull-Out Torque or Maximum Torque.

**BREATHING AIR:**

Specialty compressed, filtered and dried air meeting OSHA breathing air requirements.

**BUBBLE TIGHT:**

A commonly used term to describe the ability of a control valve or regulator to shut off completely against pressure.

**BUNA-N:**

A soft, synthetic rubber used as the elastomer on many 'O' rings and seals in general application.

**C-FACE OR C-FLANGE (MOTOR MOUNTING):**

This type of motor mounting is used to close couple compressors where the mounting holes in the face are threaded to receive bolts from the compressor.

**CAPACITY:**

A term which refers to the amount of compressed air delivered by a compressor or required by a system. The term capacity is usually qualified by something else, such as SCFM, ICFM etc.

**CHECK VALVE:**

Air in-line valve that stops the flow of compressed air in one direction.

**CLEARANCE:**

In a reciprocating compressor cylinder it is that volume contained in one end of the cylinder that is not swept by the movement of the piston. It is the space between the top of the piston and the cylinder head at the end of the compression stroke 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.

**CLEARANCE POCKET:**

An extra volume that can be opened to the clearance space to increase the clearance and reduce the volumetric efficiency of the compressor. It is usually only temporary.

**CLOSED LOOP SYSTEM:**

A system that uses distilled water, corrosion inhibitors and/or antifreeze are circulate through a collector and storage tank in a closed loop. The heat that is picked up from the collector by the fluid is then transferred to the storage tank through the closed loop or other heat exchangers.

**COOLING TOWER:**

A device for reducing the temperature of water by bringing it into contact with an air stream where a small portion of the liquid is evaporated and the major portion is cooled.

**COMPRESSED AIR:**

Free air that has been compressed into a volume smaller than it normally occupies.

**COMPRESSION CHAMBER:**

The compressor cylinder inside which compression takes place.

**COMPRESSION RATIO:**

The ratio of the absolute discharge pressure to the absolute intake pressure within a compressor.

**COMPRESSOR:**

A machine designed for compressing air or gas from an initial intake pressure to a higher discharge pressure.

**CONDENSATE:**

The liquid that forms when compressed air is cooled. The condensate produced by compressed air is water, although it may be contaminated with oil, dirt or other materials.

**CONDENSATION:**

The process of changing a vapor into liquid condensate by the extraction of heat (cooling).

**CONTINUOUS DUTY:**

The ability to stand indefinite sustained operation without damage.

**CONTINUOUS DUTY MOTOR:**

A motor that can continue to operate within the insulation temperature limits after it has reached normal operating (equilibrium) temperature.

**CONTROL DEVICE:**

A control device is an individual device used to control functions.

**CONTROLLER:**

A device that tells a control valve what to do. Controllers can be either pneumatic or electronic. There are pressure, temperature, ph, level, differential and flow controllers. The job of the controller is to sense one of the above variables and compare it to a set point that has been established. The controller then outputs a signal either pneumatic or electronic to the control valve, which then responds so as to bring the process variable to the desired set point.

**CUBIC FEET PER REVOLUTION:**

The positive volume displaced by a blower or rotary compressor in one revolution. This figures varies with blower or compressor size.

**D-FACE OR D-FLANGE (MOTOR MOUNTING):**

This type of motor mounting is used to close couple compressors where the mounting holes in the face are threaded to receive bolts from the compressor.

**DEAD BAND:**

The range of values through which a system input can be changed without causing a corresponding change in system output.

**DELIQUESCENT DRYER:**

A dryer that employs a chemical in the form of a tablet to ABSORB moisture. The chemical then degrades into a liquid solution that is drained off periodically. As a result this type of dryer must be 'topped up' with new tablets to continue working.

**DELIQUESCENT MATERIAL:**

A desiccant that dissolves gradually while removing moisture from the air. The desiccant cannot be regenerated for further use. Usually calcium chloride or sodium chloride.

**DEPTH FILTER:**

A filter that holds contaminants usually within a labyrinth of filter media.

**DESICCANT DRYER:**

Also called a pressure swing dryer, these dryers use a chemical which can be repeatedly regenerated or dried out rather than replenished, to ADSORB moisture.

**DESIGN (BUILT-IN) COMPRESSION RATIO:**

In a rotary compressor it refers to the compression ratio that has been attained when the fixed discharge port is uncovered or exposed.

**DESIGN SPEED (RPM):**

The maximum speed at which the compressor may be operated.

**DENSITY:**

The weight of a given volume of air, usually expressed in lbs/cu ft at standard temperature and pressure conditions.

**DEW POINT:**

The dew point of air is the temperature at which water vapor will begin to condense and return to a liquid state. At this point the air is saturated and has a relative humidity of 100%.

**DEW POINT SUPPRESSION:**

This is the difference between the dew point of air entering a dryer and the dew point of the air leaving the dryer.

**DIAPHRAGM COMPRESSOR:**

This type of compressor develops pressure through the reciprocating or oscillating action of a flexible disc that is actuated by an eccentric.

**DIFFERENTIAL PRESSURE:**

The difference in pressure between two points of a system.

**DIRECT-DRIVE COMPRESSOR:**

A compressor with the motor drive force supplied by a direct coupling to the compressor rotor shaft. The rotational speed of the motor defines the rotational speed of the compressor.

**DIRECTION OF ROTATION:**

The direction of rotation of a compressor is defined as clock-wise or counter-clockwise normally when looking at the driven end of the shaft.

**DISCHARGE PRESSURE:**

The actual pressure that is available at the outlet of the air compressor.

**DISCHARGE TEMPERATURE:**

The compressed air temperature measured at the discharge flange of the compressor.

**DISCHARGE VALVES:**

Are valves that only permit air to flow out of the compression chamber.

**DISPLACEMENT:**

Otherwise referred to as swept volume. The volume displaced by the piston, rotor, or diaphragm of a compressor. Expressed in CFM, it does not take into account losses, friction, or heat. All air compressors have losses due to slippage, valve losses and clearances. These cause in-efficiencies and reduce the actual amount of air that the compressor will deliver.

**DOUBLE ACTING COMPRESSOR:**

A compressor in which compression is carried out on BOTH ends of the cylinder. Both ends of the cylinder are enclosed and the piston rod is fitted with a packing gland where it enters the cylinder to prevent loss of efficiency caused by leakage or air blow-by.

**DRIPLEG:**

The pipe going down from the bottom of the airline which collects any condensation in the pipe.

**DRYERS (DRIERS):**

A device which lowers the pressure dewpoint of the compressed air in a system.

**DUTY CYCLE:**

The relationship between the operating and resting times of a compressor.

**EXTERNAL PILOT SUPPLY:**

The use of an external air source to provide pilot air for a control valve.

**FAIL-CLOSED:**

Or NORMALLY CLOSED. Another way of describing an AIR-TO-OPEN actuator. Approximately 80% of all spring return diaphragm operators in the field are of this construction.

**FAIL-OPEN:**

Or NORMALLY OPEN. Another way of describing an air-to-close actuator.

**FAIL-SAFE:**

A term used to describe the desired failure position of a control valve. It could fail-closed or fail-open.

**FLUID:**

A liquid or gaseous material.

**FLUIDIZED:**

The suspension of solid particles in a flowing medium such as air.

**FOOT-POUND:**

The amount of energy required to raise a one-pound weight a distance of one foot.

**FOUR-WAY VALVE:**

4-port valve with one inlet port, two outlet ports to two separate volumes and normally a common exhaust port. Air is passed from the pressure source (inlet) to the normally open outlet port.

**FREE AIR:**

Air at normal atmospheric conditions. Since elevation, temperature and barometric pressure will affect free air, this term does not mean air under identical conditions.

**FUEL CONSUMPTION:**

The mass flow rate of fuel consumed by an engine drive.

**FULL LOAD SPEED:**

**Speed at which rated horsepower is developed.**

**FULL LOAD TORQUE:**

Torque required to produce rated horsepower at full-load speed.

**GAUGE PRESSURE:**

The pressure above atmospheric pressure.

**HEAT RECOVERY:**

Recovering and utilizing the heat content of the compressed air for a useful purpose.

**HERTZ:**

Preferred terminology for "Cycles per Second).

**HIGH VACUUM:**

Vacuums from 1 Tor down to 1 micron.

**HORIZONTAL COMPRESSOR:**

A compressor having the cylinder or cylinders in a horizontal position.

**HORIZONTAL OPPOSED COMPRESSOR:**

A multi-cylinder compressor with the cylinders mounted horizontally on opposite sides of the compressor frame, employing a multi-throw type of crankshaft with one crank throw per cylinder.

**HORSEPOWER:**

A unit of work equal to 33,000 foot-pounds per minute.

**INCHES OF MERCURY (Inches Hg):**

A unit of vacuum measurement normally used to measure low vacuums where 2.036 inches of mercury column is equal to 1 PSI.

**INCHES OF WATER (Inches H<sub>2</sub>O):**

A unit of vacuum or pressure measurement where 27.7 inches of water column is equal to 1 PSI.

**INERT GAS:**

One that does not enter into known chemical combination, either with itself or another element. There are six known gases of this type: helium, neon, argon, krypton, xenon and radon.

To the engineer, however, the term usually means a gas which does not supply any of the needs of combustion.

**INERTIA FORCES:**

Pulsating inertia forces are created by velocity changes when reciprocating compressor's moving parts (pistons, rods, crosshead, connecting rods) are repeatedly accelerated and retarded. The pulsating inertia forces are of the first and second order, first order forces are the same frequency as the compressor shaft speed and the second order forces are a frequency twice the shaft speed.

**INLET PRESSURE:**

This is usually measured at the inlet to the compressor and will not include any losses due to the efficiency of the air intake filter unless otherwise stated.

**INRUSH:**

The electrical current consumption during the initial turn on of an electrical device, usually of short duration (AC power only).

**INSTRUMENT AIR:**

Dry, contaminant free compressed air used with pneumatic instruments and controls.

**INSULATION:**

Non-conducting materials separating the current-carrying parts of an electric motor, from each other or from the core.

**ISOTHERMAL COMPRESSION:**

Occurs when all of the heat of compression is extracted as quickly as it is produced and the temperature of the air or gas remains constant as the pressure increases. This compression cycle is most widely seen in rotary dynamic compressors.

**INTERCOOLER:**

A heat exchanger for removing the heat of compression between two stages. It may be either air cooled or water cooled.

To have a true two-stage compressor, you must have intercooling between the stages. Otherwise you have only a two-step compressor, where the second stage is taking inlet air the same temperature as discharged by the first stage. Intercooling decreases the heat of the air going from the first stage to the second stage thereby improving the efficiency of the compressor and reducing the amount of horsepower required to compress the air. True two-stage compressors with proper intercooling are generally more efficient than single-stage compressors, especially when compressing air to pressures above 100 PSIG.

**INSTRUMENT PRESSURE:**

The output pressure from a controller that is used to operate a control valve. It is the input signal to the valve.

**INTAKE VALVES:**

Valves that only permit air to flow into the compression chamber.

**KILOBAR (kb):**

A unit of 1,000 bars of pressure.

**KILOWATT (kW):**

A unit of power equal to 1,000 watts.

**KILOWATT HOUR (kWh):**

A unit of work done in one hour at the rate of 1,000 watts.

**LAPPED-IN:**

A term that describes a procedure for reducing the leakage rate on metal-to-metal seated valves. The two surfaces are lapped together with the aid of an abrasive compound in an effort to establish a better seating surface than would normally be achieved by means of machining.

**LIQUID RING COMPRESSORS:**

A compressor, which uses a rotor with multiple forward-inclined blades, which rotate about a central cone containing an inlet and discharge port. Compression occurs as a captive ring of liquid moves in and out of the blades while following the shape of the casing.

**LOW PRESSURE ORIFICE TEST:**

A test method used to accurately measure the actual capacity of an air compressor.

**MASS FLOW:**

The amount of flow of air in pounds per hour or pound-moles per hour which can be converted into ACFM by the following relationship:

$$\text{ACFM} = (\text{Moles/Hr.}) \times (.1785) \times [T_1 (\text{°F}) + 460] / P_1 (\text{PSIA})$$

**MEMBRANE DRYER:**

A dryer that reduces dewpoint by passing compressed air through a mass of hollow membrane fibres. Water vapor and part of the compressed air permeates the membrane walls and vents to the atmosphere.

**MERCURY U-TUBE MANOMETER:**

This is similar to the water manometer except that mercury is used instead of water. Since mercury is 13.6 times as heavy as water, a certain air pressure will cause it to rise in the U tube only 1/13.6 as much as the water would rise. An air pressure which would cause a differential of 5 inches on a water column will cause a differential of only 5/13.6 of an inch on a mercury column. We are therefore able to read vacuum or pressure 13.6 times as great with the same U tube after replacing the water with mercury.

**MICRONS:**

A unit of measurement in high vacuum where 1000 micron = 1 Torr or 0.001mm Hg

**MILLIBAR:**

A unit of measurement where 1 Bar – 1000 millibars.

**MODULATING CONTROL:**

An intake control system fitted to a compressor where the inlet valve hunts and throttles so that the amount of air delivered matches the demand.

**MOISTURE SEPARATOR:**

A device for separating and removing moisture that has condensed from the air or gas by the process of cooling.

**MOMENTARY SIGNAL:**

A pilot signal present for only a brief period of time.

**MOTOR SERVICE FACTOR:**

A 1.15 Service Factor means the motor can be loaded past its nameplate rating by 15%. A 1.0 Service Factor means it cannot be loaded past its nameplate rating. Most open drip-proof and TEFC motors have a 1.15 Service Factor while explosion-proof motors have a 1.0 Service Factor.

**MULTI STAGE COMPRESSORS:**

Are compressors in which compression from the initial to the final pressure is completed in two or more distinct stages.

**NORMALLY CLOSED:**

When the application of air pressure to an actuator is required to cause the valve to open. This is another way of saying the valve is Fail Closed or Normally Closed.

**NORMALLY OPEN:**

When the application of air pressure to control valve actuator is required to cause the valve to close. This is another way of saying the valve is Fail Open or Normally Open.

**OIL-FREE:**

The term generally applies to the condition of the air either when it leaves the compressor, or after filtration. An oil-free compressor will have no lubrication on the compression side of the machine. However this may not result in oil-free compressed air, simply due to the fact that the ambient air being sucked into the compressor will contain hydrocarbons which will condense into liquid oil further down stream.

**OIL-LESS:**

A term applied to compressors that contain no oil. A small reciprocating compressor with PTFE piston rings and guide, sealed for life bearings and no sump oil.

**PASCAL:**

SI unit of pressure equal to one Newton per square meter. 1 Pa is a very small unit of pressure. For this reason kPa (1000 Pascal's) is more often used. 1 PSI – 6.8948 kPa.

**PILOT SIGNAL:**

Pneumatic pressure applied to the top of the main valve poppet piston in a control valve to permit actuation; can be initiated by a remote air pilot valve or an integral electrical solenoid valve.

**PILOT VALVE:**

A small valve normally operated to actuate a larger remote air control valve.

**P&ID DRAWINGS:**

A schematic diagram showing the position of valves, switches, pumps etc in a flow or process.

**PISTON DISPLACEMENT:**

The swept volume, which is displaced by the compressor piston at the rated speed, and generally expressed in CFM. For multi-stage compressors, only the piston displacement of the first stage is considered.

**PISTON SPEED:**

The distance, in feet, travelled by the piston in one minute.

**PNEUMATIC TOOLS:**

Tools that operate by air pressure.

**POLES:**

The number of magnetic poles set up inside the motor by the placement and connection of the windings.

**POSITION TRANSMITTER:**

A device that is mechanically connected to the stem of a control valve and will generate and transmit either a pneumatic or electric signal that represents the valve stem position.

**POSITIVE DISPLACEMENT COMPRESSORS:**

Compress by confining successive volumes of air or gas in a closed space. Pressure is increased as the volume of the closed space is reduced.

**PORTABLE COMPRESSORS:**

Compressors consisting of a compressor and driver mounted on a trailer or axle so that they may be readily moved as a complete unit.

**POWER FACTOR:**

Ratio of true power (KW) to apparent power (KVA).

**PRE-FILTER:**

A filter, which precedes the compressed air dryer usually for the protection of desiccant.

**PRESSURE:**

The force per unit area exerted by a gas on a body or surface. In the British system, pressure is usually measured in pounds per square inch (PSI); in international usage, in kilograms per square centimetres, or in atmospheres; and in the international metric system (SI), in newtons per square meter.

**PRESSURE DEW POINT:**

The dew point of air at actual operating pressure.

**PRESSURE RATIO:**

The ratio of the absolute discharge pressure to the absolute inlet pressure.

**PRESSURE SWING DRYER:**

A regenerative desiccant dryer either heatless or heat reactivated.

**PSIG – POUNDS PER SQUARE INCH:**

This is the pressure of a system, which you would see displayed on a normal pressure gauge. It is the pressure of the system, over and above atmospheric pressure.

**PULSATION BOTTLE:**

Sometimes called a pulsation damper this is a small receiver fitted on the inlet or discharge of a reciprocating compressor. The device is designed to remove the resonance from the compressor to reduce pulsation and noise.

**PUMPDOWN TIME:**

The amount of time required for a system to pump down from startup to final operating levels.

**PURGE FLOW:**

A flow of air necessary to regenerate a desiccant dryer.

**RATED TEMPERATURE RISE:**

The permissible rise in temperature above ambient when operating under load.

**RATIO OF SPECIFIC HEATS:**

K or N that equals  $C_p/C_v$ . A thermodynamic quantity that is different for various gases and gas mixes. It is used in calculating horsepower and temperature rises.

**RECEIVER:**

The pressure vessel used to contain compressed air.

**RECIPROCATING COMPRESSOR:**

Piston or diaphragm type units that develop pressure through the action of a piston or pistons moving in a reciprocating motion within a cylinder or cylinders. The cylinder arrangement may be vertical, horizontal, or angular.

**REFRIGERATED DRYER:**

A dryer that chills compressed air, forcing the air to produce condensate and thereby drying it.

**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 temperature, usually expressed in percent.

**RELIEF VALVE:**

A device fitted to piping or an air receiver that allows the system pressure to vent before the safe working pressure is exceeded.

**ROTARY SCREW COMPRESSOR:**

A compressor that uses two intermeshing helical rotors, which are mounted in a close tolerance casing. Air is trapped between one convex (male) rotor and one concave (female) rotor, and compressed as the volume of air is decreased along the length of the rotor.

**ROTARY VANE COMPRESSOR:**

A compressor that uses vanes, which slide radially in an eccentrically mounted rotor. As the rotor rotates air is trapped between the vanes, compressed and discharged.

**ROTOR (ELECTRIC MOTOR):**

Rotating element of an induction machine.

**ROTOR (ROTARY COMPRESSOR):**

The rotating element(s) of a rotary screw or vane compressor.

**ROUGH VAC:**

Vacuum levels down to 1 Torr or 1mm Hg.

**SHAFT INPUT:**

The power required at the compressor drive shaft. Losses in external transmissions such as gears and belt drives are not included.

**SINGLE ACTING COMPRESSOR:**

A compressor in which compression takes place on one end of the cylinder only. The other end of the cylinder is normally open to the crankcase and does not use a crosshead.

**SINGLE ACTING RECIPROCATING COMPRESSOR:**

A compressor in which compression takes place in one stroke per revolution.

**SINGLE STAGE COMPRESSOR:**

Are those in which compression from the initial pressure to the final pressure takes place in a single stage.

**SLIP (BLOWERS OR ROTARY COMPRESSORS):**

The occurrence of a certain amount of air which "slips" back between the clearances of the rotors and housing, from the higher pressure side to the low pressure side or from discharge to inlet.

**SLIP (ELECTRIC MOTORS):**

Percentage difference between synchronous and operating speeds.

**SOLENOID:**

An electro-mechanical device using electrical energy to create linear motion.

**SPECIFIC ENERGY REQUIREMENT:**

The shaft input per unit of compressor capacity.

**SPECIFIC GRAVITY:**

Is the ratio of the specific weight of air or gas to that of DRY air at the same temperature and pressure.

**SPECIFIC POWER CONSUMPTION:**

A quick and easy way of comparing compressor efficiencies. The total package power is divided by the actual volume delivered at a specified pressure. This provides a figure of HP per cfm. Some people turn this figure around and quote CFM per HP, or Cu Meters/hour per kW.

**SPRING RETURN:**

A return of a control valve to its normal (unactuated) state by means of spring rather than compressed air pressure.

**STAGE:**

Is a single step of compression.

**STALL PRESSURE:**

A term used on 'air movers' such as axial or turbo compressors. Imagine a fan sucking air into a sealed room. Eventually the pressure in the sealed room equals the duty of the fan, although the fan continues to operate it cannot move any more air. The fan has reached its stall pressure.

**STANDARD CUBIC FEET PER MINUTE (SCFM):**

Is delivered air at specific conditions of 68 degrees F, an atmospheric pressure of 14.70 PSIA and a relative humidity of 36 percent (0.0750 density).

**STANDARD TEMPERATURE AND PRESSURE:**

Standard temperature of 68<sup>o</sup> F and a standard pressure of 14.7 psia.

**STARTING TORQUE:**

Torque produced by a motor at rest when power is applied.

**STATOR (ELECTRIC MOTOR):**

Stationary housing of a motor.

**STATOR (ROTARY COMPRESSOR):**

The stationary outer casing of a rotary screw or vane compressor.

**SWEPT VOLUME:**

This term, which is the same as piston displacement, is mainly used by companies selling small compressors because it makes their compressors look bigger than they really are. The swept volume is the actual displacement of the piston, forgetting such losses such as valve clearances and ring losses.

**SYNCHRONOUS SPEED:**

Maximum speed for an alternating-current motor.

Equal to  $\frac{\text{Frequency} \times 120}{\text{Poles}}$

**SYSTEM PRESSURE:**

The minimum pressure that the system requires to operate satisfactorily. The compressor must be capable of supplying enough volume at a sufficiently high pressure so that all losses can be met and the resulting pressure still exceeds the required system pressure.

**TEMPERATURE RISE COEFFICIENT:**

Used in calculating operating temperatures of a booster and is dependent on inlet pressure of booster

**TIP SPEED:**

Speed of the rotor tips in feet per minute.

**THREE-WAY VALVE:**

A three-port valve, one inlet, one outlet and one exhaust port. Normally the inlet port may be only port pressurized. To be used for the passing of compressed air from a pressure source (inlet) to a volume and then venting that volume through the exhaust port.

**TORR:**

A unit of vacuum measurement where 1 Torr – 1mm Hg and 760 Torr = 1 atmosphere.

**TORQUE:**

Rotating force produced by a motor.

**TURBO COMPRESSOR:**

A compressor that uses an impeller to speed up the velocity of air. The air radially leaves the tips of an impeller at high speed and the speeding air is slowed down in a diffuser. This causes the velocity head to be converted into a static head.

**TWO-WAY VALVE:**

A control valves consisting of two ports, one inlet and one outlet. Normally for on/off control of compressed air.

**ULTRA HIGH VACUUM:**

Vacuum levels below 1 micron.

**VACUUM:**

Vacuum is usually applied to any degree of pressure less than the atmospheric pressure of 14.7 pounds per square inch. If we reduce the pressure in an airtight container until it is say 9 lbs per square inch absolute pressure, we will have a partial vacuum. If we reduce the pressure still further until it is zero, we will have a full vacuum or perfect vacuum. When we speak of a very high vacuum we mean a very low absolute pressure. Partial vacuum is usually measured with a mercury manometer gauge and is given in inches of mercury more often than in pounds absolute pressure. Millimetres are sometimes used instead of inches. About 25 millimetres equal one inch.

**VALVES:**

Devices that control or regulate the direction or flow of compressed air or gas.

**VALVE PORT:**

A threaded external opening to the valve, which may be opened or closed as the valve is operated, to which piping is connected.

**VERTICAL COMPRESSOR:**

A compressor having the cylinder or cylinders in a vertical or radial position.

**VISCOSITY:**

A measure of resistance to change (such as a reluctance to be squeezed out a bearing) indicating the internal friction of a fluid. Viscosity in normal lubricants is reduces as temperature increases.

**VITON:**

A soft, synthetic material used for high temperature and with many fluids not handled by Buna-N.

**VOLUMETRIC EFFICIENCY:**

The ratio of the actual capacity of an air compressor to the displacement or swept volume, expressed as a percentage.

**WATER COOLED COMPRESSOR:**

A compressor employing water jackets around the cylinders and heads. Uses circulating water to carry away the heat of compression.

**WATER U-TUBE MANOMETER:**

Also called a U tube water gauge. For measuring low air pressure (under one pound per square inch) and slight degrees of vacuum, the water column or water filled U tube is used. A Glass tube is bent so that it has a length of about 30 inches or less. The length of the tube depends upon the type of work for which it is intended. The glass tube should have an inside diameter of 1/4 inch or more, otherwise capillary attraction will affect the readings. The tube should be filled about half full with water and the level marked zero. One leg of the U tube is connected to the tank or pipeline to be tested.

In use, a slight air pressure will cause the water in the connected leg to drop below the zero mark and the water in the other leg to rise. The difference in the water levels is then measure in inches. If both legs of the U tube have the same bore, the water will rise above zero in one leg the same distance that it drops below zero in the other leg.

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