

GLOSSARY

The following terms are common to the fields of air movement, general ventilation, industrial process, and pollution control. The definitions contained in this glossary provide brief descriptions of the terms as generally used in these fields. In many cases, a more thorough discussion of these terms can be found in the text of the appropriate Engineering Letter.

ABSOLUTE TEMPERATURE degrees Rankine, where absolute 0°R. = -459.7°F.; density corrections for temperature are based on the percentage rate of change in degrees Rankine: degrees Kelvin where absolute 0°K = -273.1°C.

Density (temp.) =

$$\text{Density (std.)} \times \left(\frac{460^\circ\text{F.} + 70^\circ\text{F.}}{460^\circ\text{F.} + ^\circ\text{F. (non-standard)}} \right)$$

ABSORPTION the process of one substance entering into the inner structure of another.

ACCELERATION LOSS the energy required to induce air to move at the entry to a system.

ACFM actual cubic feet per minute; the quantity or volume of a gas flowing at any point in a system. Fans are rated and selected on the basis of ACFM, as a fan handles the same volume of air regardless of density.

$$\text{ACFM} = \frac{075}{\text{actual density}} \times \text{SCFM}$$

ACTUATOR mechanical device attached to a damper to move its blades. May be manual, electric, pneumatic, or hydraulic.

ADSORPTION adhesion of a thin film of liquid or gases to the surface of a solid substance.

AF fan wheel design with airfoil-shaped blades.

AIR CONDITIONING treating air to meet the requirements of a conditioned space by controlling its temperature, humidity, cleanliness, and distribution.

AIR CURTAIN mechanical air-moving device designed to limit the influx of unwanted air at a building opening.

AIR-HANDLING UNIT factory-made encased assembly consisting of a fan or fans and other equipment to circulate, clean, heat, cool, humidify, dehumidify, or mix air.

AIR VELOCITY rate of speed of an airstream, expressed in FPM.

ALTITUDE the height above sea level of a given location. Density corrections for altitude are made using the following formula where Z is the feet above sea level.

$$\text{Density (Alt)} = \text{Density (Std)} \times [1 - (6.73 \times 10^{-6}) Z]^{5.258}$$

AMBIENT immediate surroundings or vicinity.

AMCA Air Movement and Control Association.

ANEMOMETER a device which reads air velocity such as a wind vane. In fan applications, it is usually a spinning-vane-type instrument used to read low velocities at registers or grills.

ANNEAL the process of relieving stress and brittleness in metals by heating.

ANODIZE an electrolytic action of affixing a protective coating or film, usually applied to aluminum.

ANSI American National Standards Institute.

API American Petroleum Institute.

APPURTENANCES accessories added to a fan for the purposes of control, isolation, safety, static pressure regain, wear, etc.

ARI Air Conditioning and Refrigeration Institute.

ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers.

ASME American Society of Mechanical Engineers.

ASPECT RATIO the ratio of the width to the length.

ASTM American Society for Testing and Materials

ATMOSPHERIC PRESSURE one atmosphere is approximately 14.7 PSI; 408" water gauge. Airflow is the result of a difference in pressure (above or below atmospheric) between two points.

ATTENUATION absorption of sound pressure. Attenuation reduces the amplitude only of a sound wave while leaving the frequency unchanged.

AXIAL FAN fan where the airflow through the impeller is predominantly parallel to the axis of rotation. The impeller is contained in a cylindrical housing.

AXIAL FLOW in-line air movement parallel to the fan or motor shaft.

BABBITT METAL an alloy containing tin, copper, and antimony; commonly used for lining bearings.

BACKDRAFT DAMPER damper used in a system to relieve air pressure in one direction and to prevent airflow in the opposite direction.

BALANCING the process of adding (or removing) weight on a rotor in order to move the center of gravity toward the axis of rotation.

BARCOL NUMBER a standard measure of FRP surface hardness.

BAROMETRIC PRESSURE a measurement of the pressure of the atmosphere; standard is 29.92" Hg.

BEARING LOSSES the power losses resulting from friction in the main bearings.

BERNOULLI'S THEOREM the principle that the total energy per unit of mass in the streamline flow of a moving fluid is constant, being the sum of the potential energy, the kinetic energy, and the energy due to pressure. In terms of air movement, the theorem states that the static pressure plus velocity pressure as measured at a point upstream in the direction of airflow is equal to the static pressure plus velocity pressure as measured at a point downstream in the direction of airflow plus the friction and dynamic losses between the points.

BI fan wheel design with backwardly-inclined blades.

BILLET a section of semi-finished metal or non-ferrous alloy.

BLADE LINERS pieces of material added over the wheel blades to reduce abrasion of the blades.

BLADE-PASS FREQUENCY the tone generated by the blades passing a fixed object.

BLAST AREA the fan outlet area less the projected area of the cut-off.

BOILER HORSEPOWER the capability to evaporate 34.5 pounds of water per hour into dry steam at 212°F. at sea level; 33,500 BTU/Hr.

BRAKE HORSEPOWER [BHP] mechanical energy consumed at a rate of 33,000 ft. lbs. per minute; a consumption rating, as compared to the production rating of horsepower itself.

BREAKDOWN TORQUE maximum torque a motor will produce without a sudden decrease in speed. Often referred to as pull-out torque or maximum torque.

BRINELL NUMBER a standard measure of metal surface hardness; metals with Brinell hardness ratings of 250 or more are generally considered abrasion-resistant.

BTU British Thermal Unit; heat required to raise the temperature of 1 pound of water by 1°F. The Btu/hr. required to raise the temperature of a volume of standard air a specific number of degrees is calculated by the formula:

$$Btu/hr = Temp. Rise \times CFM \times 1.085$$

CAPACITOR START MOTOR type of single-phase induction motor with a capacitor connected in series with the starting winding. High-starting and breakdown torque, medium starting current. Used in hard-starting applications; compressors, pumps, etc.

CAPTURE VELOCITY air velocity necessary to overcome opposing air currents or natural flow and cause contaminated air, fumes, or material to flow in a desired direction.

CATALYST the final ingredient that triggers the chemical reaction known as curing, which converts liquid resin to a solid.

CELSIUS a thermometric scale in which water boils at 100° and freezes at 0°, same as centigrade:

$$^{\circ}C = .5556 \times [^{\circ}F. - 32^{\circ}]$$

CENTRIFUGAL FAN a fan design in which air is discharged perpendicular to the wheel's rotational axis.

CFM cubic feet per minute; the volume of flow for a given fan or system.

COATINGS specialty coverings, typically referred to as paints, with varying degrees of resistance to atmospheric or chemical corrosion.

COEFFICIENT OF CONDUCTIVITY the rate of heat transfer through a material, expressed in Btu transmitted per hour through one square foot of surface per degree difference in temperature across the material. Figures are usually expressed for basic materials, such as wood or insulation; per inch of thickness, and called by the symbol "K".

COMPRESSIBILITY a factor used by fan manufacturers to correct performance ratings in higher pressure ranges to account for the fact that air is a compressible gas that does not follow the perfect gas laws.

COMPRESSION a phenomenon related to positive pressure. When air is forced into a system it is compressed and becomes more dense. Depending on the volume or weight of air required down stream in the positive pressure portion of the system, the volume of air at the inlet of a fan may have to be adjusted by the ratio of absolute pressure at the entrance of the fan versus the design requirements in the system.

CONVEYING VELOCITY the air velocity required in a duct system to maintain entrainment of a specific material.

CORROSION the deterioration of a material by chemical or electrochemical reaction resulting from exposure to weathering, moisture, chemical, or other agents in the environment in which it is placed.

CRP Certified Ratings Program.

CSA Canadian Standards Association. Sets safety standards for motors and other electrical equipment used in Canada.

CURVE, FAN PERFORMANCE a graphic representation of static or total pressure and fan BHP requirements over an airflow volume range at a stated inlet density and fan speed.

CURVE, SYSTEM a graphic representation of the pressure versus flow characteristics of a given system and density.

DAMPER an accessory to be installed at the fan inlet or outlet for air-volume modulation.

dba sound-pressure level corrected to the “A” weighing network.

DECIBEL the logarithmic ratio between some known reference and some quantity of electric or acoustic signal power.

DENSITY the measure of unit mass equal to its weight divided by its volume (lbs./ft.³); standard air is .075 lbs./ft.³.

DEW POINT the temperature at which condensation begins to form as air is cooled.

DFT dry-film thickness usually expressed in thousandths of an inch (mils).

DIFFERENTIAL PRESSURE the difference of static pressures at the fan outlet and inlet; also see **FAN CAPACITY**.

DILUTION VENTILATING the mixing of contaminated air with uncontaminated supply air for the purpose of attaining acceptable working or living conditions.

DIRECTIVITY FACTOR the number representative of the radiation characteristics of a sound source.

DRY-BULB TEMPERATURE the combined temperature of a water vapor and air mixture.

DUST air suspension of particles [aerosol] of any solid material, usually with a particle size smaller than 100 micrometers.

DUST COLLECTOR an air-cleaning device used to remove heavy-particulate loadings from exhaust systems prior to discharge.

DWDI double-width, double-inlet fans, Arrangement 3.

DYNAMIC BALANCE the mechanical balancing of a rotating part or assembly in motion.

DYNAMIC INSERTION LOSS a reduction of airborne noise levels affected by the installation of an acoustical silencer.

DYNE a unit of force equal to that which would accelerate one gram by one centimeter per second.

EFFICIENCY, MECHANICAL TOTAL the ratio of fan output to the power applied to the fan. Can be helpful in selecting fan size, type, or manufacturer for the same application:

$$ME = \frac{TP \times CFM}{6356 \times BHP}$$

EFFICIENCY, STATIC the ratio of fan output less the kinetic energy [outlet-velocity pressure] leaving the fan to the power applied to the fan:

$$SE = \frac{SP \times CFM}{6356 \times BHP}$$

ELEVATION the distance of the subject site above or below sea level.

END REFLECTION a known value of sound radiated back into a duct or opening.

ENTHALPY the heat content per unit mass of a substance.

ENTRY LOSS the loss in pressure caused by air flowing into a system; normally expressed in fractions of velocity pressure.

EQUIVALENT DUCT DIAMETER for rectangular duct with sides a and b is:

$$D = (4ab/\pi)^{0.5}$$

EVASE a diffuser at the fan outlet which gradually increases in area to decrease velocity and to convert kinetic energy to static pressure [regain.]

FAHRENHEIT a thermometric scale in which water boils at 212° and freezes at 32°.

$$^{\circ}F = (1.8 \times ^{\circ}C) + 32^{\circ}$$

FAN a power-driven machine which moves a continuous volume of air by converting rotational mechanical energy to an increase in the total pressure of the moving air.

FAN CAPACITY performance requirement for which a fan is selected to meet specific system calculations given in terms of ACFM at the fan inlet.

FAN CLASS operating limits at which a fan must be physically capable of operating safely.

FAN LAWS theoretical constant relationships between CFM, RPM, SP, and BHP for a given fan used in a given fixed system:

$$\begin{aligned} CFM \text{ varies as } RPM \\ SP \text{ varies as } (RPM)^2 \\ BHP \text{ varies as } (RPM)^3 \end{aligned}$$

FC fan wheel design using forward-curved blades.

FINITE ELEMENT ANALYSIS (FEA) computerized analytical technique used to divide a rotating body into many segments to determine the stress of each segment and therefore the complete body.

FLASHING sheet-metal strip placed at the junction of intersecting exterior building surfaces to make the joint water-tight.

FOOT-POUND (Ft. - Lb.) torque rating or requirement; equivalent to the force required to move a one-pound weight one foot in distance, equal to 12 in.-lb.

FORCED DRAFT how air is provided in a process, such as a combustion process; when air is blown or forced into a process, it is known as a “forced draft” system. Also see induced draft.

FPM feet per minute; commonly defines air velocity (to determine velocity pressure or suitability for material-conveying), shaft/bearing speeds (used to determine lubrication requirements) and wheel tip speeds.

FRAME SIZE a set of physical dimensions of motors as established by National Electrical Manufacturers Association (NEMA) for interchangeability between manufacturers. Dimensions include; shaft diameter, shaft height, and motor mounting foot print.

FREE FIELD the surroundings of a specific equipment location in which no obstructions or reverberant surfaces exist to distort or amplify sound waves.

FREQUENCY any cyclic event whether vibration, alternating current, or rotational speed. Usually expressed in cycles per second (cps) or just “cycles.”

FRICTION LOSS resistance to air flow through any duct or fitting, given in terms of static pressure.

FRP abbreviation for fiberglass-reinforced-plastic.

FULL-LOAD SPEED the speed at which the rated horsepower is developed. This speed is less than synchronous speed and varies with motor type and manufacturer.

FULL-LOAD TORQUE the torque required to produce the rated horsepower at full-load speed.

FUMES airborne particles, usually less than 1 micrometer in size, formed by condensation of vapors, sublimation, distillation, or chemical reaction.

GALVANIZING the process of coating or plating with a zinc-rich solution; can be a hot-dip process, cold spray, or brush application.

GAS STREAM the specific airstream composition within any fan or system.

GASES formless fluids which tend to occupy an entire space uniformly at ordinary temperatures and pressures.

GAUGE (GAGE) metal manufacturers’ standard measure of thickness for sheet stock; some examples for steel are:

<i>Gauge</i>	<i>Thickness (Inches)</i>	<i>Weight of Steel (Lbs./Ft. ²)</i>
7	.1793	7.50
10	.1345	5.625
12	.1046	4.375
14	.0747	3.125
16	.0598	2.50

GAUGE PRESSURE the pressure differential between atmospheric and that measured in the system.

GEL COAT a special resin system, sometimes including pigment, but without glass-reinforcing, that is applied to the mold before applying the FRP.

GROUND MOTOR a short circuit between any point in the motor’s electrical circuit and its connection to the ground.

HEAT EXCHANGER a device such as a coil or radiator which is used to transfer heat between two physically separated fluids.

HEPA FILTER high-efficiency particulate air filters commonly called *absolute filters*.

HERTZ frequency measured in cycles per second.

Hg symbol for mercury. Pressure is often measured in inches of mercury: (1" Hg. = 13.64" WG)

HORSEPOWER (as applied to motors) is an index of the amount of the work the machine can perform in a period of time. 1 HP equals 33,000 ft. lbs. of work per minute, also equal to 0.746 kilowatts. Horsepower can be calculated by:

$$HP = \frac{\text{Torque (ft. lbs.)} \times \text{RPM}}{5250}$$

HOUSING the casing or shroud of a centrifugal fan.

HVAC heating, ventilating, and air conditioning.

IMPELLER another term for fan “wheel.” The rotating portion of the fan designed to increase the energy level of the gas stream.

IMPELLER DIAMETER the maximum diameter measured over the impeller blades.

IMPINGEMENT striking or impacting; such as material impingement on a fan wheel.

INCH OF WATER unit of pressure equal to the pressure exerted by a column of water one inch high at a standard density (27.73" water = 1 PSI).

INCH-POUND torque equal to one-twelfth foot pound.

INCLINED MANOMETER a metering device used to obtain accurate pressure measurements.

INDUCED DRAFT how air is provided in a process, such as a combustion process; where air is drawn or pulled through a process. Also see forced draft.

INDUCTION the production of an electric current in a conductor in a changing magnetic field.

INERTIA tendency of an object to remain in the state it is in; see WR².

INLET-VANE DAMPER round multiblade damper mounted to the inlet of a fan to vary the airflow.

INSTABILITY the point of operation at which a fan or system will “hunt” or pulse; common in FC fans and some other fan types where the point of operation is left of the peak of the static-pressure curve.

INTERFERENCE FIT specified interference between mating parts requiring either a press fit or a shrink fit.

KELVIN see **Absolute Temperature**.

KILOPASCAL Kpa; metric pressure unit; one inch water gauge is 0.24836 Kpa.

KILOWATT Kw; measure of power equal to 1.34 horsepower.

L-10 BEARING LIFE the theoretical number of hours after which 90% of the bearings subjected to a given set of conditions will still be in operation; also known as B-10.

LAMINAR FLOW gas or fluid in parallel layers with some sliding motion between the layers.

LAMINATE the total structure of the FRP part. For **nyb** corrosion-resistant products it consists of a resin-rich surface and a thickness of glass-reinforced resin as required for structural strength.

LITHIUM a soft element in the alkali metal group commonly used as a lubricant base.

LOGARITHM a mathematical term used as a basis of the decimal system. A logarithm is the exponent of 10 which produces a given number. For instance the log of 100 is 2 since:

$$\log_{10} 100 = 2 \quad 10^2 = 100$$

LOUVER a device comprised of multiple blades which, when mounted in an opening, permits the flow of air but inhibits the entrance of undesirable elements.

LOWER EXPLOSIVE LIMIT the lowest percentage of an element in otherwise standard air that will explode when exposed to a spark.

MACH NUMBER a fraction of the speed of sound; used in fan engineering where air moving at a mach number of 0.9, or 9/10 the speed of sound, begins to deviate from the fan laws.

MAKE-UP AIR a ventilating term which refers to the replacement of air lost because of exhaust air requirements.

MANOMETER instrument for measuring pressure, u-shaped, and partially filled with liquid, either water, light oil, or mercury.

MAXIMUM CONTINUOUS RATING the point at which the fan is expected to operate.

MICROBAR a unit of pressure equal to one-millionth of an atmospheric pressure; 0.0000146 PSI.

MICRON a unit of measure equal to one-millionth of a meter, commonly used in dust collection and material-handling applications to designate particle size.

MIL a unit of measure equal to 25 microns or one-thousandth of an inch.

MIXED-FLOW FAN a fan where the airflow is primarily axial and is changed by the blade shape to induce a small radial flow at the discharge.

MOLECULAR WEIGHT the weight of a molecule expressed on a scale in which the carbon isotope weighs exactly 12.0; represents the sum of the weights of all the atoms in a molecule. As air is a gas mixture, it does not have a true molecular weight but an apparent molecular weight determined by the percentages of the molecular weights of each gas in a composition.

NACE National Association of Corrosion Engineers.

NATURAL FREQUENCY the frequency at which a component or system resonates.

NEC National Electrical Code.

NEMA the National Electrical Manufacturers Association; the trade association establishing standards of dimensions, ratings, enclosures, insulation, and other design criteria for electric motors.

NOISE CRITERIA a way for an architect to specify the maximum permissible sound-power level in each of the eight octave bands. NC curves give, in a graphical form, maximum permissible intensity per octave band.

OCTAVE BANDS ranges of frequencies. These octave bands are identified by their center frequencies (63, 125, 250, etc.).

OHM a measure of electrical resistance. A wire in which one volt produces a current of one ampere has a resistance of one Ohm.

OPPOSED-BLADE DAMPER a type of damper where adjacent blades rotate in the opposite direction.

OSHA Occupational Safety and Health Administration.

OSI ounces per square inch; a unit of pressure equal to one-sixteenth PSI or 1.733 inches of water.

PARALLEL-BLADE DAMPER a type of damper where the blades rotate in the same direction.

PARALLEL FANS two or more fans which draw air from a common source and exhaust into a common duct or plenum. A parallel fan arrangement is generally used to meet volume requirements beyond that of single fans. Two identical fans in parallel will effectively deliver twice the rated flow of any one of the fans at the same static pressure.

PERMANENT SPLIT CAPACITOR MOTOR very low starting torque. Performance and applications similar to shaded pole but more efficient, with lower line current and higher horsepower capabilities.

pH a symbol as part of a logarithmic designation to indicate acidity or alkalinity on a scale from 0 to 14; pH7 is taken as neutral, 6 to 0 increasingly acid, 8 to 14 increasingly alkaline.

PHENOLIC a thermosetting resin system used for coatings and adhesives.

PIEZOMETER RING a device consisting of a number of pressure taps connected to a common manifold to measure pressure.

PITCH DIAMETER the mean diameter or point at which V-belts ride within a sheave. This dimension is necessary for accurate drive calculations.

PITOT TUBE a metering device consisting of a double-walled tube with a short right-angle bend; the periphery of the tube has several holes through which static pressure is measured; the bent end of the tube has a hole through which total pressure is measured when pointed upstream in a moving gas stream.

PLENUM a chamber or enclosure within an air-handling system in which two or more branches converge or where system components such as fans, coils, filters, or dampers are located.

POINT OF OPERATION the intersection of a fan's static pressure curve and the system curve to which the fan is being applied; may be designated as velocity pressure divided by static pressure or by a given CFM and SP.

POLES the number of magnetic poles established inside an electric motor by the placement and connection of the windings.

POLYESTER a large group of thermosetting plastics which exhibit a high degree of corrosion-resistance over a wide spectrum of corrosive agents.

PSI pounds per square inch measured in gauge pressure, not including atmospheric.

PSIG pounds per square inch measured in gauge pressure, not including atmospheric.

PSYCHROMETRIC CHART a graphic depiction of the relationship between pressure, density, humidity, temperature, and enthalpy for any gas-vapor mixture, used extensively in comfort ventilation.

PULL-OUT TORQUE breakdown torque.

PURE TONE a sound that is characterized by a very uniform wave pattern. Such a sound might be created by a tuning fork.

PVC polyvinyl chloride; a synthetic thermoplastic polymer.

QUADRANT commonly the damper control plate.

RADIAL BLADE fan wheel design with blades positioned in straight radial direction from the hub.

RANDOM NOISE a sound that has an average amplitude and constantly changing frequency.

RANKINE see **Absolute Temperature**.

RAREFICATION a phenomenon related to negative pressure. When air is drawn through resistance into a fan inlet, the air is stretched out, or rarefied, and becomes less dense than at the entry to the system. While negligible at low pressures and volumes, high pressure fan selection must be based on rarefied inlet density.

RELATIVE HUMIDITY the ratio of existing water vapor to that of saturated air at the same dry-bulb temperature.

RESIN an organic polymer in liquid form which, when reacted with the proper catalyst, becomes solid.

REYNOLDS NUMBER a mathematical factor used to express the relation between velocity, viscosity, density, and dimensions in a system of flow; used to define fan proportionality.

ROCKWELL HARDNESS a standard measure of a metal's surface hardness. Also see **Brinell Number**.

ROTOR the rotating part of most AC motors.

RPM revolutions per minute.

RT fan wheel design with radial-tip blades.

RTP reinforced thermoset plastic. Also see FRP.

SATURATED AIR air containing the maximum amount of water vapor for a given temperature and pressure.

SCFM standard cubic feet per minute; a volume of air at 0.075 lbs./ft.³ density; used as an equivalent weight.

SCROLL the general shape of a centrifugal fan housing; the formed piece to which housing sides are welded.

SENSIBLE HEAT any portion of heat which effects a change in a substance's temperature but does not alter that substance's state.

SERIES FANS a combination of fans connected such that the outlet of one fan exhausts into the inlet of another. Fans connected in this manner are capable of higher pressures than a single fan and are used to meet pressure requirements greater than single fans.

SERVICE FACTOR the number by which the horsepower rating is multiplied to determine the maximum safe load that a motor may be expected to carry continuously.

SHADED-POLE MOTOR a special type of single-phase induction motor. Low starting torque, low cost. Usually used on direct-drive fans.

SHAFT SEAL a device to limit gas leakage between the shaft and fan housing.

SHUNT-WOUND MOTOR a DC motor in which the field circuit and armature circuit are connected in parallel.

SI UNITS Systeme International d'Unites, International System of Units; any one of the units of measure in the international meter-kilogram-second system.

SLIP the percentage difference between synchronous and operating speeds.

SOUND produced by the vibration of matter. The vibration causes sound waves to spread through the surrounding medium.

SOUND-POWER LEVEL acoustic power radiating from a sound source. Expressed in watts or in decibels.

SOUND-PRESSURE LEVEL the acoustic pressure at a point in space where the microphone or listener's ear is situated. Expressed in units of pressure or in decibels.

SP static pressure; pressure as measured in all directions within an air-handling system, not including the force or pressure of air movement.

SPECIFIC GRAVITY the ratio of the weight or mass of a given volume of any substance to that of an equal volume of some other substance taken as a standard. The ratio of the density of any gas to the density of dry air at the same temperature and pressure is the specific gravity of the gas.

SPECIFIC HEAT the ratio of the quantity of heat required to raise a certain volume one degree to that required to raise an equal volume of water one degree.

SPI Society of the Plastics Industry.

SPLIT-PHASE MOTOR the most common type of single-phase induction motor. Moderate starting torque, high starting current, high breakdown torque. Used on easy-starting equipment, such as belt-drive fans.

SQUIRREL-CAGE WINDING a permanently short-circuited winding, usually uninsulated and chiefly used in induction motors, having its conductors uniformly distributed around the periphery of the machine and joined by continuous end rings.

SRC Spark-Resistant Construction; AMCA standard of guidelines for general methods of fan construction when handling potentially explosive or flammable particles, fumes, or vapors.

SSPC Steel Structures Painting Council.

STANDARD AIR DENSITY 0.0750 lbs./ft.³, corresponds approximately to dry air at 70°F. and 29.92 in. Hg.

STARTING TORQUE the torque produced by a motor as it begins to turn from a standstill and accelerate. Sometimes called locked rotor torque.

STATIC BALANCE the mechanical balance of a rotating part or assembly by adding weights to counter-balance gravitational rotating of the part without power driving it.

STATIC PRESSURE the static pressure for which a fan is to be selected based on system calculations;

$$\text{fan SP} = \text{SP outlet} - \text{SP inlet} - \text{VP inlet}$$

STATOR the stationary parts of a magnetic circuit with associated windings.

SURGE LIMIT that point near the peak of the pressure curve which corresponds to the minimum flow at which the fan can be operated without instability.

SWSI Single-Width Single-Inlet Centrifugal Fans.

SYNCHRONOUS SPEED rated motor speed expressed in RPM. Synchronous speed = 120 x frequency divided by number of poles.

SYSTEM a series of ducts, conduits, elbows, filters, diffusers, etc., designed to guide the flow of air, gas, or vapor to and from one or more locations. A fan provides the energy necessary to overcome the system's resistance to flow and causes air or gas to flow through the system.

SYSTEM CURVE graphic presentation of the pressure versus volume flow rate characteristics of a particular system.

SYSTEM EFFECT the effect on the performance of a fan resulting from the difference between the fan inlet and outlet connections to the actual system, and the standardized connections used in laboratory tests to obtain fan-performance ratings.

TACHOMETER an instrument which measures the speed of rotation; usually in RPM.

TENSILE STRENGTH the maximum stress a material can withstand before it breaks; expressed in pounds per square inch.

TEST BLOCK an operating point above and beyond the maximum specified continuous rating demonstrating the fan margin to the customer.

THRESHOLD LIMIT VALUES TLV; the values for airborne toxic materials which are to be used as guides in the control of health hazards and represent time weighted concentrations to which nearly all workers may be exposed 8 hours per day over extended periods of time without adverse effects (OSHA).

TIP SPEED fan wheel velocity at a point corresponding to the outside diameter of the wheel blades; normally expressed in feet per minute (circumference times RPM).

TORQUE a force which produces, or tends to produce, rotation; commonly measured in ft.-lbs. or in.-lbs. A force of one pound applied to the handle of a crank, the center of which is displaced one foot from the center of the shaft, produces a torque of one ft.-lb. on the shaft if the force is provided perpendicular to, not along, the crank. Torque can be calculated by:

$$\text{Torque (ft. lbs.)} = \frac{\text{HP} \times 5250}{\text{RPM}}$$

TP total pressure; the sum of velocity pressure plus static pressure.

TUBEAXIAL FAN axial fan without guide vanes.

TUBULAR CENTRIFUGAL FAN fan with a centrifugal impeller within a cylindrical housing discharging the gas in an axial direction.

TURBULENT FLOW airflow in which true velocities at a given point vary erratically in speed and direction.

UNBALANCE the condition of a rotor in which its rotation results in centrifugal force being applied to the rotors supporting bearings.

UNIFORM FLOW airflow in which velocities between any two given points remain fairly constant.

UNIT HEATER factory-assembled unit designed to heat and circulate air. Types include steam, hot water, or gas fired.

UTILITY SET centrifugal fan designed as a packaged unit, ready to run.

VANEAXIAL FAN axial fan with either inlet or discharge guide vanes or both. Includes fixed-pitch, adjustable-pitch, and variable-pitch impellers.

VENA CONTRACTA the smallest flow area for flow through a sharp-edged orifice.

VENTILATION supplying and removing air by natural or mechanical means to and from any space.

VIBRATION alternating mechanical motion of an elastic system, components of which are amplitude, frequency, and phase.

VINYL ESTER a significant variation of polyester providing increased corrosion-resistance, strength, and flexibility, hence its suitability to the fabrication of FRP fan wheels.

VISCOSITY the characteristic of all fluids to resist flow.

VOLT a unit of electrical potential or pressure. 110 or 220 volts are normally found in the U.S.

VP velocity pressure; the pressure or force of air in motion. The common equation based on standard air is:

$$VP = \left(\frac{Velocity}{4005} \right)^2$$

VP/SP velocity pressure divided by static pressure; a single number reference used to define a fan's point of operation. Each system curve has a unique VP/SP value.

WATT a unit of power. In electrical terms, the product of voltage and amperage. 746 watts are equal to one horsepower.

WET-BULB DEPRESSION the difference between the dry-bulb and wet-bulb temperatures at the same location.

WET-BULB TEMPERATURE temperature at which air is brought to saturation by evaporating a liquid into the air at the same temperature.

WG water gauge; see Inch of Water.

WR² the unit designation of fan wheel rotational inertia in lb.-ft.², also known as WK².

YIELD STRENGTH maximum stress to which a ductile material can be subjected before it physically distorts.