VACUUM TERMINOLOGY

Bott, Dan. "Vacuum Terminology," in Industrial Vacuum 101 Part One: The Basics of Vacuum Technology, (DENCO PRINTING LLC, 2001), 147-166.

WORD	DESCRIPTION
Absolute Pressure and Temperature	A term used to describe pressure and temperature that have zero as a base point. Absolute pressures and temperatures are different from gauge pressures and temperatures that use some other point as a reference such as atmospheric pressure or 32 degrees F. Absolute vacuum reads 0" HgA at perfect vacuum. Absolute temperature is usually measured in Rankine or Kelvin where 0 degrees is the complete absence of heat.
Absolute Rating	A filtration term, it is the size of the largest particle that will pass through a filter element. The diameter of the particle is usually rated in microns.
Absolute Zero	The zero point on an absolute temperature scale (0 degrees Rankine or Kelvin).
Absorb	To draw a material in to another material. Similar to a sponge soaking up water.
Absorption	The embodiment of a gas or vapor in the interior of some other solid.
Accumulation Leak Test	This is a vacuum leak test that is designed to magnify a very small leak. The test gas is collected over time in a closed system or in a sealed part so that a leak rate can be determined.
Accuracy	The degree of precision of a test or instrument. Usually referred to vacuum gauges.
ACFM/CFM	Capacity term in vacuum referring to the volumetric flow rate or actual pumping speed at a given pressure/temperature in cubic feet per minute. Actual Cubic Feet per Minute or Cubic Feet per Minute. ACFM and ICFM have the same meaning.
Activated Carbon	A very highly adsorptive form of carbon. Termed "activated" because it has to be processed to obtain the high adsorptive capacity.
Actuation Pressure	The differential pressure setting of an indicator which signals an actuator or vacuum pump.
Adsorb	The collection of a gas or vapor in condensed form on the surface of a solid material.
Adsorbent	A solid material that adsorbs another material, such as clay, carbon, or activated alumina.
Aerosol	Coalescing term to describe a suspension of very small particles in a gas stream.
Air Inlet Valve	A valve used for letting atmospheric air into a vacuum system or chamber. Also called a vacuum breaker, air release valve, or vent valve.
Air Regulator	Control device used to meter air into a portion of a vacuum system.
Alternating Current or AC	Electrical supply that reverses direction at a prescribed rate (60 Hz for example). Used in most industrial applications.
Ambient Pressure	The barometric pressure of the local atmospheric area.
Ambient Temperature	The temperature level of the local atmospheric area.
American Institute of Physics	Parent organization of the American Vacuum Society.
American Vacuum Society	An organization that coordinates many of the standards in the vacuum industry.
American Wire Gauge or AWG	A standard used to describe the size of a wire. The larger the value of the AWG number, the thinner the selected wire.

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Anti-suck back Valve	Typically, a check valve that is built in to the inlet of a vacuum pump and is designed to prevent the migration of oil and air from a vacuum pump into the system when the vacuum pump stops and the chamber or system is under vacuum. Negates the need for a separate check valve.
Atmospheric Pressure	Pressure exerted by the atmosphere at a specific location. Atmospheric pressure can and does change all the time based on altitude and weather conditions. The standard atmosphere is typically 14.69 PSIA (usually rounded to 14.7) and can also be designated by a mercury column of 760 mm in height at 0 degrees C.
Atomic Mass Unit (AMU)	Used as a basis to measure gases or air in a vacuum system by a residual gas analyzer, the atomic mass unit is the unit of measure of a particle which could be an atom, molecule or ion. The actual value of the particle's mass in AMU is equal to its atomic weight.
Audible Leak Indicator	This is a device that is an accessory to a leak detector. It converts the output leak signal to an audible sound where the frequency is proportional to the relative size of the leak.
Background	In leak detection, it is the signal generated by residual tracer gas that is left in the vacuum system. Since the tracer gas can not be removed quickly, the background signal can build over time. Is also called a "virtual leak" of the tracer gas.
Backing Pump	A vacuum pump used to evacuate gases from the discharge of another vacuum pump. Can be used for diffusion pumps, turbomolecular pumps, blowers, etc. Also called a forepump.
Backstreaming	This is the backwards flow of the oil from a vacuum pump into the chamber or system piping. Usually occurs at higher vacuum conditions when the vapor pressure of the lubricant is reached.
Baffle	Usually a plate or stage that protects a filter or filter elements from direct contact with the contamination entering a system or filter. They are used in many oil and liquid separator designs to keep the final stage free from heavy loading.
Bar	The unit of pressure equal to 106 dynes per square centimeter. This is the European standard atmospheric pressure which is equal to 14.5 PSIA.
Barometric Pressure	The reading of an atmospheric pressure at a certain place and specific time.
Bell Jar	A typically clear container that is open at the bottom, closed at the top and is used as a vacuum chamber or test vessel.
Belt-Drive Vacuum Pump	A pump with the motor drive provided by a belt/sheave system. Sheaves are attached to the pump shaft and the motor shaft. The ratios of the diameters of the pump and motor sheaves determine the actual rotational speed of the pump.
BHP (Brake Horsepower)	This is the total horsepower required at the input shaft of a vacuum pump at specific pressure. BHP curves can be generated to show the input horsepower over the entire vacuum range the pump can achieve.
Blank Off Pressure	The ultimate vacuum that a pump can reach on a closed off inlet port. Also called ultimate pressure of a vacuum pump.
Blind Spots	A location in a filter media where there is no filtration taking place. Can be due to design considerations or other-mechanical blocking.

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Blinding	A filtration team, it is the reduction or complete shutting off of flow due to closed pores in a filter media.
Booster Pump	Typically a Roots type rotary lobed blower. These pumps act as high capacity "boosters" to mechanical backing pumps at specific vacuum ranges. There are also some vapor pumps that are referred to as booster pumps.
Bridging	Usually seen at seal faces and top plates of filter elements, this refers to particles that arch over individual openings in filter media or through open passages.
Buna-N	Elastomer seals that are made of a Nitrile rubber compound. There are many different formulations of Buna that can be applied to specific applications.
Bypass Valve (Relief Valve)	Typically seen in oil mist exhaust applications, this is a valve mechanism that assures system air flow when a prescribed differential pressure across a filter element is exceeded.
Cake	Filtration term referring to solids deposited on a filter media or surface.
Capacity (Dirt Holding Capacity)	The amount of debris or contamination that a filter element is capable of holding without exceeding a specified differential pressure at rated flow.
Cavitation	Applied mainly to water sealed liquid ring vacuum pumps, it is the process where small bubbles are formed inside the compression chambers which then rapidly implode. Usually, this results from too much vacuum applied to a water sealed liquid ring vacuum pump.
Center Tube	The metallic tube inside a filter element designed to support and provide structure to the filter media in a filter element. It also provides adequate fluid flow. The maximum allowable differential pressure determines the structural characteristics of the tube.
Centipoise	A unit of absolute viscosity. One centipoise equals 0.01 poise.
Centistoke	A unit of kinematic viscosity. One centistoke equals 0.01 stoke.
CFR (Cubic Feet per Revolution)	Used in many rotary lobe blower calculations, it is the volume displaced by a rotary lobed blower in one revolution. CFR will vary with blower size and configuration.
Cleanable Filter Element	A filter element that can be washed, blown out or cleaned when it reaches a given differential pressure. Once the element is cleaned, it must be able to work adequately when placed back in service.
Coalescing	The process where small aerosols and fine mists are combined into larger droplets that can be removed from an air stream. Final coalescing is usually done with a specific coalescing element after the air stream passes through several baffle stages.
Cold Trap or Condenser	An inlet accessory in a vacuum system that is designed to condense vapors prior to the inlet of a vacuum pump. Used in many wet applications and in systems where corrosive or toxic gases are present. Many condenser designs are of the shell and tube configuration.
Collapse Pressure	The pressure at which a filter element deforms to the point where it is allowing bypass of contamination. Also described as the minimum differential pressure that a filter element is designed to withstand without permanent deformation.

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Compound Mechanical Pump	A rotary or mechanical vacuum pump having two or more stages of compression in series. Higher vacuum levels are typically attained with more stages of compression.
Compression Ratio	The ratio between the outlet pressure and the inlet pressure of a vacuum pump for a specific gas or gas mixture.
Concentration	Usually expressed in terms like PPM (parts per million) and mg/M3 (milligrams per cubic meter) it is the amount of one substance entrained in another substance. For example, 1 PPM of oil entrained in an air stream is equal to 0.72 ounces of oil per 100 SCFM and 100 hours.
Conductance	This is the actual capacity of a vacuum piping system in terms of flow. Can be described in ACFM, M3/Hour, Liters/Second, etc. Conductance in a vacuum system can be limited by line size and line configuration.
Contaminant	An unwanted solid, liquid or gas that is present in a vacuum inlet airstream.
Cover Plate	Also called a blank-off plate, it is a cap on an open port in a vacuum system or on the inlet to the vacuum pump.
Cracking	Usually used in terms of vacuum pump oil, it is the decomposition of complex oil molecules into compounds of lower complexity and weight.
Cut In Point	Typically used with vacuum blower systems, it is the pressure that the backing pump has to pull to before the blower can be turned on. After the blower is in operation, the system is pulled down to the target level of vacuum.
Cycle	The process of pulling vacuum on a closed system, performing the desired work, and then venting the system to atmospheric pressure (or other target pressure). Also, it is the length of time a filter assembly is in operation before cleaning is necessary.
Degassing	Removing gas from a solid or liquid material under vacuum.
Delta P	Used as a description of component efficiency in a vacuum system, it is the pressure drop or differential pressure across that component.
Density	The mass of a substance for a specific volume of that substance. Expressed in terms such as pounds/cubic foot, or grams/cubic meter.
Differential Pressure	See Delta P. It is the difference in pressure between two points in a vacuum or filter system. In filter assemblies, it is usually expressed as the Delta P between a housing inlet and outlet.
Diffusion Pump	A very common high vacuum pump used for industrial applications. A diffusion pump is a vapor pump that has to be operated at high inlet vacuum conditions and must have a mechanical backing pump to compress diffusion pump discharge air back to ATM pressure.
Direct-Drive Pump	A vacuum pump where the electric drive motor is directly coupled to the rotor shaft on the pump. The rotational speed in RPM of the motor is equal to the rotational speed of the vacuum pump.
Displacement	A term used by many vacuum pump manufacturers, it is the geometric swept volume of the compression chamber at typical RPM's. It is also called free air displacement. This value, being theoretical, is not typically used by end-users. It is mainly a used as a standard by vacuum pump manufacturers.

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Dissociation	The breakdown of a compound or substance into two or more components. Certain vacuum processes will exhibit dissociation and actually raise pump capacity requirements. Dissociation is also sometimes referred to as cracking.
Drift	The change in the amount of background output in a helium leak detector due to i mperfections in the electronics rather than changes in the background level of helium.
Effective Filtration Area	The surface area in a filter element that is exposed to process flow and can effectively remove contamination.
Efficiency	In pump terms, it is the ratio of the actual pumping capacity to the theoretical swept volume. In filtration, it is the ability of a filter element to take out contamination. Efficiency is usually expressed in terms of a percentage removal rate (i.e. 99.5% efficient at 10 microns).
Equivalent Nitrogen Pressure	Term used by manufacturers and users of electronic vaunt gauges. It is that pressure that a vacuum gauge would read if the system atmosphere was nitrogen instead of the actual system gas mixture.
Explosion-Proof Motor	Used in many process and chemical applications on vacuum pumps, it is an enclosed motor that will withstand an explosion of a specific vapor or gas completely within its housing.
Factory Calibration	The tuning or altering of a vacuum gauge by the manufacturer to bring (or keep) the device in specification.
Filter Assembly	All parts of an inlet or discharge vacuum filter. Typically consists of a filter housing and filter element. The filter housing will have an inlet port and discharge port and a means to change out the element.
Filter Element	Pleated or wrapped media cartridge that performs the actual filtration process.
Filter Media	The "cloth" used in a filter element. Most vacuum applications use either paper or polyester as the base material.
Filtration	The process of separating solids and vapors from an incoming gas stream.
Flow Rate	The amount of air per unit time that is generated by a production process which then passes through a vacuum pump. Is expressed in volume flow terms such as ACFM or in mass flow terms such as SCFM or Pounds/Hour.
Footprint	The space a piece of equipment occupies on a production work floor or surface.
Fore pressure	The total pressure on the outlet side of a high vacuum pump measured near the outlet port. Sometimes called the backpressure (or backing pressure), outlet pressure, exhaust pressure, or discharge pressure.
Foreline	Vacuum line connecting the vacuum system to the inlet of a vacuum pump.
Foreline Valve	A vacuum valve installed in-line so that the backing pump can be isolated from the lead pump or high vacuum pump.
Forepump	See Backing Pump.
Free air	Many times used in error as SCFM, it is air flow at local atmospheric conditions. Temperature, atmospheric pressure and water content are usually not equal to standard conditions so Free Air must be adjusted to account for these differences.

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Fuller's Earth	Media used to filter chemical contamination in vacuum pumps. A highly absorbent form of clay.
Gas	A gas is a substance in a state of matter where each molecule is not hindered by the forces generated by other molecules (gravity, strong and weak nuclear forces, etc.) so these molecules are free to occupy any space within a container. In vacuum work, a gas can be considered permanent or a vapor which is condensable.
Gas Ballast	A device used to prevent the condensation of vapors in a vacuum pump by admitting a small amount of air into the compression chamber. This device not only prevents the condensation of vapors, it can also help remove condensed vapors in vacuum pump oil.
Gauge Pressure	A vacuum scale that uses atmospheric pressure as a reference point. Inches of Mercury Vacuum for example. On the pressure side, PSIG for example.
GPH	Gallons per hour.
GPM	Gallons per minute.
Halogen	The group of elements which includes fluorine, chlorine, bromine, and iodine and similar materials.
Halogen Leak Detector	A leak detector that measures leaks by detecting halogens present in a vacuum system or halogens emanating from a closed, pressurized vacuum system.
Helium Leak Detector	A leak detector that measures leaks by detecting helium present in a vacuum system or helium emanating from a closed, pressurized vacuum system.
High Vacuum	Vacuum range from 0.001 to 0.000001 torr.
Hot Cathode Ionization Gauge	See Ionization Gauges.
Hydrophilic	A material that attracts water.
Hydrophobic	A material that repels water.
ICFM (Inlet Cubic Feet per Minute)	Air flow at inlet conditions to the inlet of rotary lobed blower or booster vacuum pump. In vacuum applications, it is the same as ACFM.
Implosion	Opposite of explosion, it is the result of a vessel or structure not being able to withstand the forces associated with vacuum conditions. The walls of the vessel will rapidly collapse, collide and then rapidly explode outward.
Inches of Mercury	Two very common scales used to measure vacuum pressures ("HgA and "HgV). The scale ranges from 29.92" Hg to 0" Hg and scale orientation depends on whether it is used as a gauge scale or an absolute scale. One inch of mercury equals 25.4 torr.
Inches of Water	Units used to measure small pressure differentials across filter components for both vacuum and pressure applications. One inch of water column equals 1.868 torr (or 1 PSI = 27.7" H2O).
Inlet Pressure	The total pressure at the inlet of a vacuum pump.
In-line Type Filter	Used in many blower applications, it is a filter housing where the inlet and outlet ports are located on a common plane or center line.

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Ionization Vacuum Gauge	A group of high vacuum gauges that actually ionize gas molecules which are then collected and measured. There are two main types of ion gauges: Hot Cathode and Cold Cathode. Hot cathode ion gauges produce ions by means of a hot filament. This type of gauge is also called a Bayard-Alpert ionization gauge. The Cold Cathode ion gauge (also called the Philips Gauge) produces ions by utilizing a cold cathode discharge in the presence of a magnetic field.
Isolation Test	Sometimes called a pressure decay or rate of rise test, this test measures the amount of leaks present in a vacuum system. The vacuum pump pulls the system down to target operating vacuum level and is then isolated from the system. The rate of pressure rise is timed to determine the leak rate.
Isolation Valve	A valve that seals off a vacuum system from the vacuum pump when the pump is off.
Leak	A porosity or hole in a vacuum system. Can be detected by a variety of methods such as tracer gas detection, rate of rise testing, ultrasonic detection and soap bubble testing.
Leak Detector	An instrument used to locate leaks in a vacuum system.
Leakage Rate	The amount of air entering a vacuum system. Typically measured in Atmospheric CC's per second or Millibar Liters per Second.
Low Vacuum or Rough Vacuum	Vacuum range from atmospheric pressure to 29.88" HgV (1 Torr).
L-Type Filter	A filter housing where the inlet and outlet ports are 90 degrees to each other. Vacuum industry standard CSL design.
Mass Flow	The weight of a gas or air flow going into a vacuum system. Usually expressed in SCFM or Pounds per Hour and is then converted to volume flow (ACFM) for pump sizing.
Mass Number	The molecular weight of a gas or substance (i.e. Air = 29).
Mass Spectrometer	In vacuum applications, the two most common Mass Spectrometers are the helium leak detector and the residual gas analyzer. These devices measure gases with specific AMU's to determine either leaks or gases present in vacuum systems.
McLeod Gauge	A liquid level mercury vacuum gauge that measures the pressure in a vacuum system.
Mean Free Path	A value used in many vacuum calculations, it is the average distance that a molecule will travel before it collides with another molecule.
Mechanical Efficiency	Usually expressed as a percent, it is the ratio of the actual pumping speed of a vacuum pump to the theoretical displacement.
Mechanical Pump	General term referring to oil sealed vacuum pumps of liquid ring, rotary vane, rotary screw, rotary piston, etc. design.
Medium Vacuum	The pressure range from 1 torr to 0.001 torr.
Mesh	Filtration term designating the number and size of openings per inch of a material.
Micrometer or Micron	A unit of length. A micron is one millionth of a meter or 0.000039" (39 millionths of an inch). Expressed in convenient terms, 25 microns is approximately equal one thousandth of an inch (.001").
Micron (Micron of Mercury)	Usually used to measure medium vacuum conditions, it is a unit of pressure equal to 0.001 Torr. Also referred to as a millitorr.
Millibar	One thousandth of a Bar. 1,103 millibar is equal to atmospheric pressure.

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Millimeter of Mercury	See Torr.
Millitorr	Pressure measurement equal to 0.001 Torr. See micron.
Molecular Flow	Flow range in vacuum that refers to the random passage of air molecules through a section of pipe or through an orifice. Occurs at high vacuum conditions.
OEM	Original Equipment Manufacturer.
Oil Separator Element	Coalescing element designed to trap oil aerosols, mists and droplets prior to the discharge of a vacuum pump.
Open Drip-Proof Motor or ODP	Motor designation that describes an electric motor with ventilator openings that will prevent liquids and solids (dropped vertically) from interfering with its operation.
Outgassing	The evolution of gas from a material in a vacuum.
Partial Pressure	The pressure exerted by an individual gas in a mixture of gases. For example, an air mixture will exert a total pressure in a system. The constituents that make up air will each exert a portion of that total pressure.
Particle Size Distribution	Filtration term that describes the micron size distribution of a sample of particulate matter from a filter system or vacuum pump.
Perfect Gas	Also called an ideal gas, it is generally a gas that obeys Boyle's and Charles' laws.
Pirani Gauge	A thermal conductivity vacuum gauge used most commonly in rough and medium vacuum applications.
Pounds Per Hour (#/Hr)	A unit of mass flow used in vacuum applications.
Pressure	Force exerted per unit area.
Pressure Differential	The difference of pressure across a component. It is the difference between the pressure on the inlet side of the component and the pressure on the discharge side of a component.
PSID	Pounds per Square Inch Differential, also called Delta P.
PSIG	Pounds per Square Inch Gauge. Uses atmospheric pressure as a reference point.
Pump Fluid	In rough vacuum, pump fluid refers to the lubricating or seal fluid of a mechanical vacuum pump.
Pumpdown Curve	A graph that represents the pumpdown of a vacuum system over the course of a specified amount of time. It is used to determine the time required to achieve the target pressure in a vacuum system with a specific vacuum pump.
Pumpdown Time	The amount of time required for a system to pump down from start-up to final operating vacuum levels. Also called the time of evacuation.
Pumping Speed	Refers to ACFM capacity of a vacuum pump. Also means the amount of gas that can be removed from a system over a period of time.
Roughing	The initial pumpdown of a vacuum system.
Roughing Pump	The vacuum pump used to evacuate a high vacuum system to the point where the high vacuum pump can take over.
SCFM	Standard Cubic Feet per Minute. The standard for mass flow in vacuum systems at standard conditions: 760 torr, 68 degrees F and 36% RH.

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Soap Bubble Test	A method of leak detection where the vacuum system is pressurized with air and suspected leak points are coated with a soapy water solution to determine if leaks are present.
Stage	One compression step in a vacuum system. Vacuum pumps can have several stages directly built in or additional vacuum pumps can serve as addition compression stages (i.e. blower packages).
Staging Ratio	The ratio of the capacity of a booster pump to the capacity of a backing pump.
Standard Room Temperature	There are two values used commonly: 20 degrees C (68 degrees F) or 25 degrees C (77 degrees F).
Throughput	A term used frequently to describe flow in medium and high vacuum systems. It is a measure of the amount of gas that passes a cross sectional area of pipe. Throughput units are pressure-volume units — for example Torr-Liters/Second.
Tight (Leak Tight)	Refers to a system with a leak rate that is below a prescribed level. In other words, the leak rate is lower than the system specification.
Time of Evacuation	The time required to pump a given system from atmospheric pressure to a specified base pressure. Also known as pumpdown time or exhaust time.
Tip Speed	Speed of gear, lobe or helical screw tips expressed in meters per second or in feet per minute.
Torr	Unit of pressure measurement equal to 1/760th of a standard atmosphere. Equal to 1 mm of mercury.
Total Pressure	Refers to the sum of all partial pressures in a gas mixture.
Tracer Gas	The gas, such as helium, that passes through a leak and is then detected helium leak detector. Also termed "search gas".
Transition Flow	One of the three primary flow regimes in vacuum piping, it is the flow of air through a pipe that occurs between viscous flow and molecular flow.
Trap	An accessory used condense vapors present in a vacuum system.
Turbulent Flow	The tumultuous flow of air in a vacuum piping system that occurs at the beginning of viscous flow.
Ultimate Pressure	Lowest attainable pressure in a vacuum pump or system. See Blank-Off Pressure.
Ultrahigh Vacuum	Range of vacuum pressures below 1 x 10-6 torr.
Ultrasonic Leak Detector	A device that detects the frequency of the sound of air entering a vacuum system through a hole or porosity.
Vacuum	Any pressure in a system that is less than the ambient atmospheric pressure.
Vacuum Cooling	Rapidly evaporating a liquid from the surface of a product or material under vacuum to reduce the temperature. This process is performed regularly on produce prior to transportation.
Vacuum Dryin	The removal of a liquid from a substance by evaporation inside a vacuum system. When the liquid is water, the process is sometimes called vacuum dehydration.
Vacuum Gauge	Any instrument used to measure pressure in a vacuum system. Called manometers, diaphragm, thermocouple, pirani, McLeod, Bourdon Tube, etc.

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Vacuum Manifold	Part of a vacuum system piping configuration. Typically, there are a number of branches or ports available so that a number of vacuum processes can be operated simultaneously.
Vacuum System	A pneumatic system designed for the manufacture of a product or the operation of a process. Typically consists of a vacuum pump or pumps, vacuum chamber, interconnecting piping, and a variety of other accessories and components such as filters, gauges and receivers.
Vapor	A material or substance in the gas phase that is condensable at ambient temperatures.
Vapor Pressure	The pressure exerted by the vapor of a liquid when it is in equilibrium with the liquid.
Virtual Leak	The appearance of a leak in a vacuum system that is caused by the release of trapped gas.
Volumetric Efficiency	The ratio of the actual capacity of a vacuum pump to the theoretical capacity. Typically expressed in percentages.
Viscous Flow	One of the three primary flow regimes in vacuum piping, it is the flow of air through a pipe that occurs when the mean free path of the air molecules is very small in relationship to the diameter of the pipe. The flow can be viscous laminar or viscous turbulent.