# Product Note, PN 447, Revision 2
# Gas Delivery Component Terms

August 31, 2023

The following is a compilation of terms related to AP Tech products and their use. It should be noted that certain terms may have different definitions or words for the concept when used by others:

**Absolute pressure**: A pressure measured relative to zero, with zero pressure being a perfect vacuum. Refer to PN 438 for explanation of absolute and gauge units.

**Absolute pressure regulator**: A pressure regulator designed to control outlet pressure at vacuum, below atmospheric pressure, 0 psig (0 barg).

**Adiabatic compression:** A thermodynamic process which occurs without transferring heat or mass between the system and the surroundings. It causes a rise in the temperature of the gas when pressurizing to a higher pressure. Refer to test reports 30011300, 30009800 and 30016558 for related information.

**Accuracy**: The closeness of an observed value to a true (reference) value. The total uncertainty of an observed value, including both precision and bias.

**Accuracy pressure regulator:** The amount of pressure drop from a static, no flow, condition to a given flow. Some consider a regulator's accuracy the variation in outlet pressure when compared to the regulator's dynamic set point during a steady state flowing condition.

**Across the seat leakage, pressure regulator**: A constant increase in pressure on the outlet side with no flow (static) or in the closed position. Refer to PN 422.

**Across the seat leakage test**: A test for leakage across the internal seal or seat inside a valve or a regulator. For regulator across the seat leak testing refer to PN 422.

**Across the seat leakage, valve**: A constant increase in pressure from the one side (inlet or outlet) to the other side of a valve when in the closed position.

**Actuation pressure**: The amount of pressure required to actuate and fully open a valve or to control a pressure regulator that is operated pneumatically.

**Accumulation pressure**: The increase in pressure above maximum allowable working pressure of a vessel or system during a relief process.

**Accumulation pressure, back pressure regulator:** The increase in pressure above a back pressure regulator set point as the device is open across the seat.

**Ambient pressure**: The pressure in the surrounding environment of a device. The standard condition for ambient pressure is at sea level, though the pressure does change depending upon weather conditions.

**Ambient temperature:** The temperature in the surrounding environment of a device.

**Angstrom**: A unit of measure that is equal to one ten billionth of a meter.

**AOD**: Argon oxygen decarburization; a process used to manufacture single melt stainless steel and can be the primary melt process for secondary re-melt stainless steel. Refer to PN 414 regarding single melt and remelt stainless steel. AOD is a refining process which typically follows the initial melting process EAF (Electric Arc Furnace). It is not necessarily the primary 'melting' process.

**AOD/VAR**: Argon oxygen decarburization / vacuum arc re-melt; a double melt process (often referred to as secondary re-melt) used to further refine and eliminate contaminants found in stainless steel. Refer to PN 414 for further information regarding remelt material.

**AOP:** Air operated valve; a valve that is operated by a pneumatic pressure.

**Automatic valve**: A valve that can be operated remotely by using a pneumatic or electric actuator.

**Back mount**: The ability to mount a component from the bottom or rear of the component.

**Back pressure regulator:** A device which maintains a defined pressure upstream of itself. When the inlet (upstream) pressure exceeds the set point, the internal valve opens to relieve the excess pressure.

**Balanced poppet (valve)**: A main valve which has been designed such that the forces upon the valve from the media on the inlet and outlet sides are equal – balanced. Hence, the poppet spring provides the majority of the seat shut-off force.

**Bar – pressure**: A unit of pressure measurement - 1 bar = 14.5 psi. Refer to PN 438 for further explanation.

**Bellows**: A pleated, extendable and contractible sensing or control element.

**Bell jar**: A canister used to subject components to vacuum. Bell jars can be used in various types of component leakage testing.

**Bellows valve**: A valve that incorporates a bellows as a means to open and close the valve.

**Bias:** A systematic deviation of value from a reference value. The amount by which an average set of values departs from a reference value.

**Bias – pressure regulator**: The pressure differential between the dome pressure and the outlet pressure of a dome loaded regulator. The bias can be natural or accomplished with a spring called a bias spring.

**Bonnet:** The housing, cap, that contains the adjusting mechanism and load spring of a pressure regulator.

**BSPP:** British Standard Parallel Pipe; a straight thread connection, also known as G, which seals on a ring.

**BSPT:** British Standard Pipe Taper; a tapered threaded connection, also known as R, where mating threads seal to each other with a sealant such as [1]Teflon® tape. BSPT is different than NPT and the two will not mate with each other.

**Bulk gases**: Gases which are stored in larger vessels than typical cylinders. Common bulk gases are nitrogen, argon, oxygen and hydrogen but can be other specialty gases which are stored either in liquid or gaseous state.

**Burst pressure**: The maximum pressure which a component can be subjected to and not rupture. Permanent deformation and leakage are permitted, but parts may not be thrown. Accepted industry burst pressure standard is three or more times (300%) maximum operating pressure. It should be noted that a pressure regulator has two maximum operating pressures, inlet and outlet.

**Calibration gas**: Reference gas that is used to correlate an equipment's output to a known standard.

**Cap:** A term used by AP Tech for the part which is compressed to clamp a diaphragm to the body. In a regulator, often referred to as a bonnet or a spring housing. It is also a term used for a protective cover or blind nut on a fitting.

**Cap holder:** A term used by AP Tech for the part which compresses the cap. Also referred to as a cap nut or with a regulator as a bonnet nut.

**Cap restraint:** This is an AP Tech term for securing a regulator cap (bonnet) as the cap holder (bonnet nut) is tightened. It prevents rotation of the cap during torquing which can result in a compromised diaphragm to body seal.

**Captured bonnet**: A bonnet, cap, of a device that can contain the process fluid in the event of a sensing element failure, rupture or break.

**Captured venting**: A feature incorporated in a self-venting pressure reducing regulator which provides an additional port to permit the piping away of the expelled fluids from the regulator's vent valve. Can also be referred to as captured bonnet.

**CDA:** Clean Dry Air, refers to lower moisture and other contaminates in compressed air. The specifications vary.

**CGA (Compressed Gas Association) connection**: A fitting used to connect the gas system to a cylinder of gas. The configuration of the fitting, thread and sealing surface, varies per gas to help ensure gases are connected to the proper gas system and not intermixed.

**Check valve**: A device that allows flow in one direction and prevents flow in the opposite direction.

**Choked flow:** Compressible fluid effect, a limiting condition when mass flow will not increase with a further decrease in downstream pressure for a fixed pressure upstream. The point at which the flow demand is greater than the controlling capabilities of a pressure regulator.

**Cleanroom**: An area or room in which the particulates are controlled within specified parameters.

**Compression fitting:** A tube fitting that utilizes a ferrule to seal to the outside of a tube. It is often referred to as a [2]Swagelok® fitting because of the popularity of the Swagelok design.

**Constant bleed (CB):** A device that has a continual flow when closed that cannot be shut off. Refer to PN 430 for further explanation.

**Control element**: One of the three basic elements of a pressure regulator. It acts to reduce a high pressure (P1) to a lower working or outlet pressure (P2). The control element may be called a main valve, valve stem, or poppet depending upon manufacturer.

**Cracking pressure** – **back pressure regulators**: The pressure at which the internal valve opens and flow starts. This could also be termed as the set pressure.

**Cracking pressure – check valves**: The pressure differential inlet to outlet at which a check valve opens and allows forward flow.

**Cracking pressure - relief valves:** The pressure when a relief device starts to open and vent.

**Creep**: Another term for a regulator across the seat leak but also can be used for regulator lock up, though lock up is the preferred term.

**Crosstalk:** A term for a pressure regulator's outlet pressure to change due to another component in the gas system – typically a mass flow controller (MFC) The changing outlet pressure causes the MFC to react changing flow which causes the outlet pressure to change and the cycle repeats.

**Cylinder pressure**: The gas pressure contained in a source vessel.

**Cv**: A flow coefficient which is defined as the flow of water through a wide open device in gallons per minute (GPM) with a one PSI pressure drop when measured from inlet to outlet. There are formulas to calculate Cv using gases and pressure drop through the device. AP Tech uses N2 and gas formulas to determine a device's Cv.

**Diaphragm**: A thin flexible membrane that can be either metallic or non-metallic.

**Diaphragm valve**: A valve that incorporates a diaphragm moving element that isolates the process fluid from the atmosphere.

**Differential pressure regulator**: A pressure regulator which is designed to provide a controlled pressure which is the sum of a signal (reference/dome) pressure and a bias pressure. The bias may be either positive or negative.

**DIN:** European cylinder valve connection system, similar to CGA, from the German Institute for Standardization. Different connection configurations matched to specific gases.

**DISS:** Diameter Index Safety System, cylinder valve connection, similar to CGA, where connection configurations are matched to specific gases.

**Distribution valves and regulators**: Valves and regulators located downstream of the source. Often referred to as point of use (POU) valves and regulators.

**Dome loading**: Adjusting a regulator outlet pressure using a control pressure to the bonnet (cap) instead of using an adjustment spring. The dome pressure is normally applied by a second regulator called a dome or pilot regulator. Control pressure is applied to the non-wetted side of a sensing element, such as a diaphragm, which could allow process gas to mix with control pressure gas in the event of a failure. A pneumatically actuated regulator enables safe pneumatic control compared to dome loading.

**Droop**: Regulator outlet pressure drop with increasing flow.

**Droop curve:** A graph which depicts a regulator's outlet pressure over a range of flows with a specified gas and at a given inlet pressure, also called a flow curve.

**Dynamic pressure regulator adjustment:** Setting (adjusting) a pressure regulator with flow through the device. Pressure will rise as flow stops or decreases.

**EAF:** Electric Arc Furnace is typically the primary melting process in stainless steel production, often followed by the AOD refining process.

**Electropolish (EP):** An electrolytic process used to enhance the surface characteristics of a metal such as stainless steel. The process erodes the surface and frees surface ions to produce a more chemically inert surface.

[3]**Elgiloy®:** A super alloy, UNS R30003, commonly utilized for as a spring or diaphragm material.

**Face seal fitting:** A generic term for a UHP fitting which is compatible with a [4]VCR®.

**FFKM:** A perfluoroelastomer commonly used for a seal material. [5]Kalrez® and [6]Chemraz® are trademarks for common FFKM materials.

**FKM:** A fluoroelastomer commonly used for a seal material. [7]Viton® is a trademark for common FKM material.

**Flatbottom:** Another term for surface mount, refer to surface mount and IGS.

**Flow capacity:** The maximum and minimum flow capability of a regulator or valve established at a specific set of conditions.

**Flow curve**: A graph which depicts a regulator's outlet pressure over a range of flows with a specified gas and at a given inlet pressure, also called a droop curve.

**Flow rate**: The volume of fluid that passes through a device over a specific period of time. Units of measure include: SCFM, SCFH, SLPM, SCCM, GPM and GPH.

**Free poppet regulator:** A regulator that does not have a mechanical connection between the sensing element and the poppet. Refer to PN 402 for further explanation.

**Galling:** A form of wear caused by adhesion between two sliding, mating surfaces. Material transfers from one surface to the other. An example is thread galling, where parts being threaded together seize on the threads before fully tightened.

**Gas cabinet**: A metal enclosure that houses gas delivery equipment and/or gas source vessels to safely contain hazardous materials in the event of a leak.

**Gas cylinder**: A vessel to hold and store compressed gas.

**GIB - gas interface box**: A gas system enclosed in a cabinet typically adjacent to the process tool or onboard the tool. It is the final gas system prior to the process chamber. The gas system is very similar to a VMB and VMP.

**Gas Tungsten Arc welding - GTAW:** Welding process typically used in semiconductor component and systems manufacturing, most commonly without filler metals. Common GTA processes can include orbital welding, in which the tungsten rotates around the workpiece and lathe welding, in which the workpiece rotates around the tungsten. Also referred to as TIG for welding for Tungsten Inert Gas.

**GPM:** Gallons per minute flow rate. GPH is gallons per hour rather than per minute.

**Hasp:** A locking device which enables a lock, such as a padlock, to be installed. The 3657 valve, for example, is designed to utilize a hasp (Master Lock™ #420) which is attached to the valve and enables multiple padlocks to be locked to the hasp for lockout/tagout.

**[8]Hastelloy®:** A trademark of Haynes Corporation for a high nickel alloys with superior corrosion resistance compared to 316L stainless steel.

**Hysteresis**: A change in state as you approach a given point from two different directions.

**Hysteresis – regulator:** The pressure difference at a specific flow when approached from an increasing flow condition compared to a decreasing flow condition.

**Hazardous gas**: A gas that is dangerous - flammable, reactive, corrosive or toxic.

**High purity:** Applications for gas purity of a minimum 99.99% purity with components typically of 316 stainless steel, metal diaphragms and threaded connections such as NPT or compression.

**IGS (Integrated gas system):** A method of mounting devices by using substrate blocks rather than traditional fittings. Also referred to as surface mount or down mount. The type and geometry of seal are of various configurations.

**Inboard leak test**: A helium leak test performed by evacuating the inside of a component to a helium leak detector (mass spectrometer) and spraying helium on the outside. Refer to PN 442.

**Inert gas**: A gas that does not react chemically with other materials.

**Inlet pressure**: The pressure at the inlet side of a device.

**inHg (inch of mercury)**: A unit of pressure measurement. Refer to PN 438 for further explanation.

**Internal leakage:** Refer to across the seat leakage

**IV4 – internal face seal:** A port machined into the body of a regulator or valve that is compatible with ¼" male face seal fittings. The female threads machined in the body are not silver plated, like a conventional face seal female nut, which can lead to galling as the fitting is made up.

**Joule-Thomson effect:** The change in temperature that accompanies the expansion of a gas without production of work or transfer of heat. The expansion is isenthalpic, enthalpy remains unchanged. Refer to PN 407 for further information.

**kPa (kilopascal)**: An international unit of pressure measurement - one kPa = 0.1451 psi. Refer to PN 438 for further explanation.

**[9]KYNAR®:** A plastic material also known as PVDF, polyvinylidene fluoride. AP Tech utilizes as a seat material and is specified KYN.

**Laser Beam Welding – LBW:** A fusion welding process in which a laser beam provides a highly concentrated heat source producing a deep and narrow fusion zone with a much smaller heat affected zone when compared to other welding processes. The three most common laser beam sources are Solid state (nd:YAG) lasers; Gas (CO2) lasers; and fiber laser.

**Leakage**: The transfer of media from a contained area to another area.

**Leakage – internal**: Refer to across the seat leakage.

**Leakage – outboard**: External leakage from inside the component to the outside.

**Liquified gases**: Gas stored in a liquid phase by combination of temperature and pressure.

**Load element:** One of the three basic parts of a pressure regulator. It is also termed a sensing element. In a regulator it is a diaphragm, piston or bellows which have a force applied to achieve a pressure set point.

**Lock-up**: The outlet pressure increase in a regulator to achieve shut off which is above the "set pressure" as the flow is decreased to zero from a low flow (<5% of devices flow rating). Defined by some as creep or static increment.

**LOTO**: Lock out tag out; a device that allows for some type of locking or a multiple lock device to be installed to prevent the operation.

**$M^3$/hr:** Cubic meters per hour, conversion to slpm multiply by 1,000 and divide by 60.

**Mass flow controller**: A device used to measure and control the flow of gas.

**Mass flow meter**: A device used to measure the flow of a gas.

**Micro inch (µ inch):** Unit of measure, one millionth of an inch - 10 µ inch = 0.25 micron.

**Micron:** Metric unit of measure, one millionth of a meter – 1 micron = 40 µ inches.

**Minimum controllable flow**: The lowest volume of fluid, gas, or liquid, a regulator can flow and still maintain steady state conditions.

**Minimum controllable pressure**: The lowest pressure which a regulator can control and still maintain satisfactory performance.

**[10]Monel®:** A high nickel and copper alloy, UNS N04400, trademark of Special Metals Corporation, that provides excellent corrosion resistance. Popular for petro-chemical applications where external corrosion is an issue. Limited applications in semiconductor applications, primarily F2 gas, due to copper tending to leach into the process stream with chlorinated gases.

**Monoblock:** A term for a component using one body to incorporate multiple functions, such as two valves with one common body or a valve body that connects a main line to flow through with on/off control to a side branch.

**mmHg (millimeter of mercury)**: A unit of pressure measurement - one mmHg = one torr. Refer to PN 438 for further explanation.

**MPa (megapascal)**: A unit of pressure measurement - one MPa = 145.01 psi. Refer to PN 438 for further explanation.

**Multi-port:** Valves with more than two ports are multi-port. The ports can be any combination of inlet and outlet along with connection types. Many manufacturers publish a porting guide to explain porting configurations and how to designate connections.

**NC - normally closed**: This term is used for air operated valves (AOP) and it refers to the state of the valve, closed across the seat, without a pneumatic signal applied, requires control pressure to open.

**NO – normally open**: This term is used for air operated valves (AOP) and it refers to the state of the valve, open across the seat, without a pneumatic signal applied, requires control pressure to close.

**Non-relieving**: A regulator that does not vent the downstream pressure when adjusting to a lower pressure set point without flow. This feature is sometimes called non-venting because the trapped pressure is not released as the set point is lowered.

**Nozzle:** A device, generally tapered, used to speed up or direct the flow of a fluid. The nozzle of a venturi is where the fluid increases velocity and decreases pressure.

**Nozzle – pressure regulator:** AP Tech uses the term nozzle for the part which clamps the seat to the body, to direct the flow through the seat orifice.

**NPT:** National Pipe Thread; a tapered thread in inches where mating male and female parts seal on the mating tapers, generally with a sealant material such as Teflon tape.

**Outboard leakage:** A leak from inside to outside of a device. Refer to PN 442.

**Outboard helium leak test with a bell jar:** A leak test where the device under test is pressurized with helium while in an evacuated bell jar connected to a helium leak detector. Refer to PN 442.

**Outboard helium leak test with sniffer probe:** A leak test where the device under test is pressurized with helium and a vacuum wand connected to a helium leak detector to test for leakage. Refer to PN 442.

**Outgassing**: The release of an absorbed material.

**Outlet pressure (P2)**: The pressure of the fluid media, gas, or liquid, measured from the low pressure side (outlet) of a regulator.

**Overshoot / undershoot:** A term for pressure regulator performance where outlet pressure upon flow starting goes below or above set point before settling to set point. Pressure going below and then above set point repeatedly is termed ringing.

**Oxygen cleaned:** Cleaning a device's wetted areas and parts to be free of hydrocarbons and other contaminates which may ignite in the presence of an oxidizer, such as oxygen. Refer to PN 436 for further information.

**P1**: See "Inlet Pressure."

**P2**: See "Outlet Pressure."

**Panel mount**: The ability to mount a valve or regulator through a hole in a panel allowing the porting to be behind that panel for hook-up and knob to be on opposite side of the panel.

**Pascal:** A unit of measurement - 1000 pascal = 0.145 psi. Refer to PN 438 for further information.

**Passivation:** A process to change surfaces by removing surface iron (Fe) or other surface contamination on a part, commonly with a diluted nitric acid immersion. Passivation is also a process of slowly exposing surfaces to increasing concentrations of a chemical.

**PCTFE:** A fluoropolymer, polychlorotrifluoroethylene, formerly known as [11]Kel-F 81®. It is translucent plastic material commonly used in valves and regulators as a seat material. AP Tech utilizes the material as a standard with many models and is not required to be specified.

**[12]PEEK®:** A plastic material, polyetheretherketone, AP Tech uses as an optional seat material specified PK.

**PFA:** A fluoropolymer, perfluoroalkoxy alkanes, in the Teflon family, AP Tech uses as an optional seat and seal material specified PF.

**Pigtail**: A flexible assembly of piping (tubing) used to connect a cylinder of gas to a gas system.

**Pilot regulator:** A pressure reducing regulator that applies a gas or hydraulic pressure into the actuation port of a dome loaded or pneumatically actuated regulator. The pilot regulator should be of the self-venting-relieving type regulator to allow pressure in the actuator to be adjusted to a lower pressure without need of opening a secondary valve.

**Piston**: One of the three types of sensing elements which has dynamic seals to atmosphere. It is the most common type of regulator for delivery pressures above 500 psig.

**Pneumatically actuated (PA) regulator:** A regulator with a separate actuating mechanism to pneumatically apply force to control outlet pressure. Unlike dome loading which is a similar concept, the control pressure is safely isolated from the process gas.

**Point of use (POU)**: A location that is closer to where the media is being consumed or delivered to, downstream of the source.

**Poppet:** A part which rises or falls away perpendicular to a seat. In a pressure regulator it is part of the main valve and seals to the seat.

**Pressure conditioned (PC):** A process of repeatedly pressurizing a diaphragm to change its shape and performance, refer to PN 441. PC diaphragms for valves H1, H2 or H3 options (when available as an option) are specified by adding an A after the temperature option, such as H1A.

**Pressure decay test:** Refer to static pressure test and PN 442.

**Pressurized Inboard® (PI):** This is an AP Tech registered trademarked term for a patented leak testing process. PI is a variation to inboard helium leak testing where leak points are externally pressurized with helium for enhanced test sensitivity. PI is explained in detail in PN 448.

**Proof pressure**: A pressure applied internally to a device to verify structural integrity. No deformation or leakage is permitted at this pressure and the device must function after this test. The accepted standard is 1.5 times (150%) the maximum rated operating pressure. It should be noted that a regulator has two operating pressure ratings, inlet and outlet.

**psia (absolute pressure)**: A measure of pressure in psi that is referenced to zero absolute pressure. To convert psig to psia add 14.7 psi. Refer to PN 438 for further explanation.

**psig (gauge pressure)**: A measure of pressure in psi that is referenced to atmospheric pressure. Refer to PN 438 for further explanation.

**PTFE:** A fluoropolymer, polytetrafluoroethylene, in the Teflon family, AP Tech uses as a seat and seal material, specified TF for a seat.

**Purge port:** An access connection point for line purging, testing, weld purge gas introduction, etc. It is common to larger size valves which are typically welded into a gas system. The port can be connected to the upstream (inlet), downstream (outlet) or both sides of a device. The term is commonly used for ½ inch or greater size valves, whereas smaller valves simply have a port.

**Q**: See "Flow Rate."

**Ra – (Ra average)**: A surface roughness measurement that is the arithmetic average peak to valley – component irregularities from the mean line measured within a fixed sample length. If multiple readings are taken, the results are averaged.

**Ra max**: The maximum Ra finish reading allowable on a surface or in a component. If multiple readings are taken, the highest (worst) reading is the rating.

**R max:** The maximum peak to the maximum valley measurement within an established sample length.

**RM:** Relates to returned materials. Any product being shipped to the factory for any reason requires an RM number. If a product is being returned for evaluation or rebuilding, an RM form, which is posted online, must also be completed.

**Relief valve**: A pressure venting device, designed to protect and prevent the over pressurization of a gas system.

**Repeatability**: The ability of a device to return to the same point.

**Replaceable seat**: A seat that can be replaced to repair.

**Reseat pressure – back pressure regulator**: The pressure at which flow stops and the regulator reseals across the seat.

**Reseat pressure – check valve**: The pressure differential when forward flow stops and check valve seals to prevent reverse flow.

**Residual helium:** Pressure testing with helium, such as outboard leak testing, can permeate (saturate) non-metallic seats and wetted seals. The helium takes time to dissipate, and a subsequent inboard helium test can result in a false positive result – detecting residual helium rather than a true leak. Residual helium is best removed by applying vacuum which allows the helium to escape.

**Resolution – in pressure measurement devices:** The finest increment (reading) of a gauge or transducer.

**Resolution – in regulators**: Outlet pressure relative to adjustment knob turns (rotation).

**Sanitary fitting:** A clamp type, flange fitting design enabling easy assembly and disassembly of a process line, common in pharmaceutical and bio-tech applications.

**SCCM**: Standard cubic centimeters per minute, a volumetric flow at standard conditions of 0C temperature, 14.7 psia pressure and 70°F. 1,000 sccm = 1 slpm. Refer to standard conditions for further explanation.

**SCFM**: Standard cubic feet per minute, a volumetric flow at standard ambient conditions of 0C temperature, 14.7 psia pressure and 70°F. 1 scfm = 28.3 slpm. Refer to standard conditions for further explanation. SCFH is flow per hour rather than minute.

**Seat:** A part of surface upon which another part rests. In the case of a regulator, it is part of the main internal valve and what the poppet seals to. In a springless diaphragm valve, it is what the diaphragm seals to, to close the valve.

**Seat abrasion:** Seat material wearing away (abrading) or transferring to another part. In a regulator it can be caused by flow cycling, misalignment of the poppet, exceeding the devices flow capacity or instability such as resonance. Refer to PN 421 for further information.

**Self-relieving**: A regulator which automatically vents pressure above set point. This feature is sometimes referred to as self-venting and is the opposite of non-relieving.

**Sensing element**: One of the three basic elements of a pressure reducing regulator. It reacts to changes in the outlet pressure to open or close the internal valve. It is generally a diaphragm, piston or bellows.

**Sensitivity:** The ability of a pressure regulator to respond to change in discharge conditions, outlet pressure.

**Set pressure**: The desired operational outlet pressure for a regulator which can be adjusted either with no flow or flowing condition.

**Set-ability**: The minimum pressure increment which can be reasonably achieved when adjusting a pressure regulator.

**Shutoff valve**: A valve installed in a gas piping system designed to stop the flow of media through the system.

**Single stage regulator**: A regulator that only incorporates one pressure reduction.

**SLPM**: Standard liters per minute, a volumetric flow at standard ambient conditions of 0C temperature, 14.7 psia pressure and 70°F. 28.3 slpm = 1 scfm. Refer to standard conditions for further explanation. SLPH is flow per hour rather than minute.

**Specialty gases:** Purity level differentiates a specialty gas from an industrial gas. There are three common grades of specialty gases: high purity (99.99% min. purity), ultra high purity (99.999% min. purity) and research grade (99.9999% min. purity).

**Specific gravity – gas (Sg)**: The ratio of the mass of a gas to the mass of the same volume of air at the same temperature.

**Specific gravity – liquid (SL)**; The ratio of the specific weight of any liquid to that of water in the same volume at ambient temperature.

**Source regulators / valves:** Regulators and valves used at the gas source vessel.

**Springless regulator:** A regulator designed without the use of a wetted poppet spring.

**Standard conditions:** Pressure and temperature values for testing uniformity - one atmosphere (14.7 psia) and 0° C (32°F). AP Tech standard conditions for testing are 14.7 psia and 21°C (70° F)

**Static increment:** The outlet pressure increase in a regulator to achieve shut off which is above the "set pressure" as the flow is decreased to zero from a low flow (<5% of device's flow rating). Defined by AP Tech as lock up and some as creep.

**Static pressure testing:** Leak testing by trapping a test gas, typically N2, for a period of time to test for leaks. Test gas, test pressure, trapped volume, time and temperature influence test sensitivity. Please refer to PN 442 for further information about leak testing and PN 435 for information about quantifying the leak rate.

**Static pressure regulator adjustment:** Setting (adjusting) outlet pressure of a regulator without flow through the device. Pressure will decrease with flow from this setting.

**Supply pressure effect**: The effect on the outlet pressure of a regulator as a result of a supply pressure change (example: an increase in outlet pressure due to a decrease in inlet pressure). Typically expressed as a given rise per given drop in supply pressure. Refer to PN 403 for further explanation.

**Surface mount:** A method of mounting devices by using substrate blocks rather than traditional fittings. Also referred to as IGS (integrated gas system) or downmount. The type and geometry of seal are of various configurations.

**Test port:** A hole located to enable leak testing of a joint, such as a hole in a nut that aligns with a mechanical joint of a diaphragm seal to a body or a hole in a female face seal nut that aligns with the gasket being sealed. Sometimes referred to as a weep hole.

**Torr**: A unit of pressure measurement, common for vacuum applications - one torr = one mmHg. Please refer to PN 438 for further explanation.

**Three Way Valve:** A valve with three (3) separate connection ports, that enables three (3) modes of operation: off, two (2) ports connected and a different set of two (2) ports connected. Commonly either two (2) inlets and one (1) outlet or one (1) inlet and two (2) outlets. Often referred to as a diverter valve or mixing valve. Diaphragm valves cannot be made three way.

**Two Way Valve:** A valve with two separate connection points, commonly referred to as inlet and outlet with two modes of operation: off (inlet not connected to outlet) and on (inlet connected to outlet). Two way valves may have multiple ports, meaning more than two (2) connection ports. Multiple port two way valves are often confused with three way valves. Diaphragm valves can only be made two way.

**Tied diaphragm regulator:** A regulator that has a mechanical connection between the sensing element and the poppet. This type of regulator is normally used at the gas source. The tied diaphragm feature provides additional safety in the event the regulator experiences across the seat leakage. Please refer to PN 402 for further explanation.

**Trip point-flow switch:** A flow at which a flow switch sends a signal indicating excess flow.

**Two stage regulator:** A pressure regulator that incorporates two pressure reductions within a common body. The first pressure reduction typically has a preset pressure with the second pressure reduction having an adjustable set point. Refer to PN 409 for further explanation.

**Two stage regulation:** Two regulators in series (not a common body) providing pressure reduction in two steps.

**Two step valve:** A valve that has dual modes of operation – metered flow and full flow. Sometimes referred to as a soft vent valve in vacuum chamber application because it allows low flow for initial venting prior to full flow to minimize turbulence.

**Ultra high purity (UHP):** Applications with a minimum gas purity of 99.999% typical of the semiconductor industry. Gas system attributes include welded construction, components with metal to metal seals to atmosphere, low Ra surface finishes, low internal volume and few dead legs.

**Ultraclean:** Another term for UHP.

**Unbalanced poppet (valve)**: The most common poppet design. Inlet pressure provides the majority of the shut-off force. The function of the valve is to reduce the high inlet pressure to a lower outlet pressure.

**Vacuum generator:** A device which produces vacuum by means of a venturi effect. Compressed gas flows through a conical orifice and as the gas leaves the orifice restriction, the pressure drops and velocity increases producing vacuum. Refer to PN 434 for further information.

**Valve**: A device that controls the flow of gas or liquid. Functions can include shut off, metering or pressure relief.

**Venturi:** A conical orifice that causes a fluid to increase velocity and decrease pressure.

**[13]Vespel®:** Brownish (Vespel SP1) plastic material used in valves and regulators as an optional seat material. Most commonly used for high temperature applications and high pressure N2O service. Specified with a VS in the model number.

**VIM/VAR**: Vacuum induction melt / vacuum arc re-melt. A double melting process for 316L SST, the dual melt process is used to minimize the level of impurities in the 316L SST.

**VMB (valve manifold box):** A gas manifold contained in an enclosure (box) that is used to divide one incoming gas line into multiple gas lines.

**VMP (valve manifold panel):** A gas manifold that is used to divide one incoming gas line into multiple gas lines and is not contained in an enclosure (box).

**Weep hole:** Another term for test port, refer to test port for definition.

**Wetted parts:** The internal parts of a device that are exposed to media contact.

**Xt**: The percentage of pressure drop across a device at which additional pressure drop will not result in an increase of flow. Xt is used in Cv calculations for compressible gases. Refer to PN 417 for further explanation.

[1]Teflon® is a registered trademark of the Chemours Company
[2]Swagelok® is a registered trademark of Swagelok Company
[3]Elgiloy® is a registered trademark of Combined Metals of Chicago, L.L.C.
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