

# Valve Terminology & Glossary

**Accumulator** – A vessel in which a gas is trapped and compressed by the liquid in a hydraulic system, thus storing energy to supply liquid under pressure to the system when needed.

**ACME Thread** – A flat-topped screw thread for power transmission. This thread has a 29-degree included angle between adjacent thread faces compared with the 60-degree angle of the US standard V thread.

**Actuator Device** – Used to operate a valve using electric, pneumatic or hydraulic means. Often used for remote control or sequencing of valve operations.

**Adapter Spool** – An extension that is added to a short face-to-face valve to conform to standard API 6D face-to-face dimensions.

**(AGA) American Gas Association** - A society comprising gas companies set up to achieve common goals.

**(AISI) American Iron and Steel Institute** - An association of steelmakers that sets standards for the chemical and physical properties of steel and iron in various shapes and forms – pipe, tubing, sheet, strip, and wire.

**All-Welded Construction** – Pertains to a valve construction in which the body is completely welded and cannot be disassembled and repaired in the field.

**Alloy steel** – A steel consisting primarily of iron with some percentage of one or more other elements such as chromium, nickel, manganese, or vanadium deliberately added to enhance its properties.

**Ambient Temperature** – The prevailing temperature of the environment immediately surrounding an object.

**Anchor Pin** – A pin welded to the body of a ball valve. This pin aligns the adapter plate and keeps the plate and gear operator from moving while the valve is being operated.

**Angle Valve** – A variation of the globe valve in which the end connections are at right angles to each other, rather than being in-line.

**(ANSI) American National Standard Institute** - The principle organization in the US that oversees the creation, promulgation and use of standards for a wide variety of items, including the design, fabrication, and testing of pressure piping, systems, and components for various pipeline services.



**(API) American Petroleum Institute** - The principal US oil company trade association. It has some standards and specification writing functions, such as wellhead components and pipeline valves.

**API SPEC 6FA** – The API specification dealing with the fire testing of pipeline valves. Once a particular size and pressure class valve is tested and passes the API fire test, all such valves can be identified with the above monogram. API-6FA supersedes API-RP-6F.

**API SPEC 6D** – An API specification dealing with pipeline valves. Most pipeline valves are manufactured to this specification and, if so, can be identified with the API 6D monogram.

**(ASME) American Society of Mechanical Engineers** - This professional society publishes technical books, papers, codes, and standards. Of principal interest is the ASME Boiler and Pressure Vessel Code which is referenced for many aspects of valve making.

**(ASTM) American Society for Testing and Materials** - A professional society governing the detailed physical and chemical analysis of all basic metals and alloys used in construction. The valves of most manufacturers have components whose materials correspond to ASTM standards.

**Atmospheric Pressure** - The external pressure exerted on a body by the atmosphere: 14.7 psi (absolute) at sea level.

**Austenitic stainless steel** - The common stainless steel, where the primary microstructure is austenite and the composition primarily iron but also includes both chromium and nickel. The steels are designated as 300 series such as 304, 316, CF8M, etc.

**(AWS) American Welding Society** - A society which sets guidelines and standards for all welds.

**BBL (bbl)** - An abbreviation for “barrel”. Used to express liquid volume. One barrel of oil is equal to 42 US gallons.

**(BDV) – Blowdown Valve** - A BDV is a valve or system of valves that, when activated, initiates a blowdown of a pipeline, plant, process, or platform; similar to an ESDV that shuts in a pipeline, the BDV opens a pipeline.

**Bevel gear operator** - Device facilitating operation of a gate or globe valve by means of a set of bevel gears having the axis of the pinion gear at right angles to that of the larger ring gear. The reduction ratio of this gear set determines the multiplication of torque achieved.

**Backpressure Regulator** - Regulator designed to control upstream pressure.



**Back seat** - A shoulder on the stem of a gate or globe valve which seals against a mating surface inside the bonnet to prevent leakage of media through the bonnet stuffing box when the valve is fully opened.

**Ball** - The closure element of a ball valve.

**Ball valve** - A valve using a spherical closure element which is rotated through 90° to open and close the valve.

**Bar** - A metric unit of pressure. One bar equals 14.5 psi.

**Belleville Spring** - A spring resembling a dished washer, used in some ball valves to push the seats against the ball. They also are used to provide live-load to packing systems on globe and wedge gate valves.

**Bending Moment** - The mechanical bending load produced by a force applied to a part at a right angle to its surface or axis. The product of the force times the perpendicular distance to the point of restraint. Usually expressed in pound-feet.

**Bevel** - A chamfer. The angle between two adjacent surfaces (other than 90 degrees). The word “bevel” is used in describing weld-end preparations. See “End Bevel”.

**(BGO) Bevel Gear Operated (or Operator)** - The actuation of a valve by means of a set of bevel gears having the axis of the pinion gear at right angles to that of the larger ring gear. The reduction ratio of this gear set determines the multiplication of torque achieved. Used on gate valves.

**Block-and-Bleed** - The capability of obtaining a seal across the upstream and downstream seat rings of a valve when the body pressure is bled off to the atmosphere through blow down valves or vent plugs. Useful in testing the integrity of seat seals and performing minor repairs under pressure.

**Body** - The principle pressure containing part of a valve in which the closure element and seats are located.

**Bolt** - A fastener that normally has a square or hex head and is threaded on the opposite end to receive a nut. Sometimes used to make up a flanged connection.

**Bolt Circle** - The circle on which bolt holes are located.

**Bolted bonnet** - A bonnet which is connected to a valve body with bolts or studs and nuts.



**Bolted construction** - Describes a valve construction in which the pressure shell elements (such as body and closures of a trunnion ball valve) are bolted together and so can be taken apart and repaired in the field.

**Bolting Sets** - Bolts or studs and nuts sometimes supplied with flanged valves to install the valve between line flanges.

**Bonnet** - The top part of a valve, attached to the body, that guides the stem and adapts to extensions or operators.

**Bore (or port)** - The inside diameter of the smallest opening through a valve, e.g., inside diameter of a seat ring, diameter of hole through ball in a ball valve.

**Brinell Hardness Number** - A number indicating metal hardness using the Brinell scale. Can be converted to Rockwell B and C hardness by reference to conversion tables.

**(BRV) Body Relief Valve** - A relief valve (optional) installed on ball valves used in liquid service to provide for the relief of excess body pressure caused by thermal expansion.

**BS 6755** - The British Standard specification dealing with the fire testing of pipeline valves. Once a particular size and pressure class valve is tested and passes the BS 6755 fire test, all such valves can be identified with the BS 6755 standard.

**Bubble-Tight Shutoff** - A phrase used in describing the sealing ability of a valve. During air pressure testing of a new valve in the closed position, leakage past the seats is collected and bubbled through water. To qualify as bubble-tight, no bubbles should be observed in a prescribed time span.

**Buried Service** - An application in which valves are installed in lines which are buried below ground level.

**Burst Pressure** - The pressure (psi) at which rupture of a stressed element or pressure-containing vessel takes place.

**Butt weld end** - The end connection of a valve suitably prepared for butt welding to a connecting pipe.

**Butterfly Valve** - A short face-to-face valve that has a movable vane, in the center of the flow stream, which rotates 90 degrees as the butterfly valve opens and closes.

**(BVR) Ball Valve Regulator** - An automatic throttling valve controlling flow or pressure in a pipeline comprising a package involving a ball valve, actuator, positioner, and controlling instrument.



**Bypass** - A system of pipes and valves permitting the diversion of flow or pressure around a line valve.

**Carbon steel** - Iron containing carbon in the form of carbides, about 0.1 to 0.3 percent carbon with no other alloying elements other than the sulfur, phosphorus, and other elements present in almost all steels.

**Cast iron** - The common term for cast gray iron or iron containing flake carbon in the range of 1% to 2%. Cast iron is brittle, exhibiting very little ductility before fracturing.

**Casting** - A product or the act of producing a product made by pouring molten metal into a mold and allowing it to solidify, thus taking the shape of the mold.

**Capscrew** - A fastener with a head whose shank is normally threaded throughout its entire length. It is not used with a nut, but rather engagement is made with a female thread in the piece to be joined.

**Cast** - The form of a particular part of a valve, where the basic shape is formed by molding rather than fabricating.

**Casting** - A part that has been formed by pouring molten metal into a mold.

**Cavitation** - The rapid formation and collapse of vapor pockets in a flowing liquid in localized regions of very low pressure – often a cause of erosive damage to pumps, throttling type valves and the piping itself. Can be the cause of excessive noise.

**Certifying (or Certification) Authority (CA)** - An independent body appointed by the purchaser to carry out a survey of the equipment and/or materials that they are buying. It is the responsibility of the supplier to provide the CA with information, documents, access to works and personnel to enable the survey to be carried out.

**Chainwheel** - Operated Valve An overhead valve operated by a chain drive wheel instead of a handwheel.

**Characterized Gate or Ball** - A ball or gate, the shape of whose port has been specially altered to provide a specific throttling capability.

**Charpy Test** - A mechanical test conducted on a precisely machined coupon of the steel to be tested. The coupon is clamped in a special machine and subjected to a lateral hammer blow. This test provides a relative measure of the toughness of the steel or its resistance to shock or impact loads. Often required for low temperature applications where testing is done at the expected minimum service temperature. (Refer to requirements of API 6D and ISO 14313.)



**Check Valve** - A one-directional valve that is opened by the fluid flow in one direction and which closes automatically when the flow stops or reverses direction. See “Clapper”.

**Chevron Packing** - A type of packing used in packing boxes consisting of a nest of V cross-section rings.

**(C.I.F.) Cost Insurance and Freight** - Shipper pays all freight and insurance charges. Same as FOB destination.

**City Gate (or City Gate Station)** - The metering and pressure-reducing station where gas is transferred from a high pressure cross-country transmission line to a low-pressure distribution piping system within a city.

**Cladding** - A method of coating metals by which the coating becomes an integral part of the material. This normally is done by welding. It is generally done on valves where special trims are required for difficult applications.

**Clapper** - The hinged closure element of a swing check valve.

**Class** - A pressure rating expressed as a dimensionless number. The class rating charts give actual pounds per square inch maximum allowable pressure at a given temperature.

**Clevis** - A U-shaped connecting yoke at the end of a stem or rod, between the ends of which a gate or other part may be pinned or bolted.

**Closure** - The end of a ball valve bolted to the body, which often contains the seat rings. Often referred to as part of the body.

**Closure Elements (Obturator)** - The moving part of a valve, positioned in the flow stream, which controls flow through the valve. Ball, gate, plug, clapper, disc, etc., are specific names for closure elements.

**Coal Gasification** - The process of manufacturing natural gas from coal.

**Compressor** - A device that converts mechanical energy into gas pressure.

**Concentric** - Having the same centers.

**Contaminant** - A particle or material which is foreign to the fluid media.

**Control Valve** - A valve that controls a process variable, such as pressure, flow or temperature, by modulating its opening in response to a signal from a controller. See “Controller”.

**Controller** - A device that measures a controlled variable, compares it with a predetermined setting and signals the actuator to readjust the opening of the valve in order to re-establish the original control setting.



**Corrosion** - The deterioration of a material due to chemical action.

**Corrosion Allowance (CA)** – An additional amount of wall thickness that is added by calculation to account for planned corrosion over the lifetime of a pressure vessel.

**Coulisse** - Of or using runners or slides as a guiding mechanism, as in a Coulisse-style gate valve.

**C-Pack** - A special stem packing designed by GROVE® to give maximum lifetime sealing in gate and check valve stems.

**Crude Oil** - Unrefined oil. Oil as it comes directly from the well.

**Cryogenic Temperature** - Any temperature below about -240° F (-151° C).

**Cryogenic Valve** - A valve capable of functioning at cryogenic temperatures.

**CV** - The capacity factor of a valve, also called the valve coefficient; specifically, the number of gallons of water per minute that will flow through a valve with a pressure drop of 1 psi.

**CWP** – Cold Working Pressure

**Cycle** - A single complete operation or process returning to the starting point. A valve, stroked from full open to full closed and back to full open, has undergone one cycle.

**Cycle Test** - A procedure whereby a valve is put through an interval of time during which a test process is completed. This can be a set number of events or it can be a continuous operation until something in the product fails.

**Cylinder Operator** - A power-piston valve operator using either hydraulic or pneumatic pressure. A sealed piston converts applied pressure into a linear piston rod (stem) motion.

**Dezincification** - A form of pitting corrosion which attacks certain zinc bearing copper-based alloys, often called "yellow brasses", when in contact with sea water or fresh water that is high in oxygen and carbon dioxide. (ASTM B61 and B62 are "red brasses" and not susceptible to dezincification.)

**Delta (IP)** - See "Differential Pressure", "Pressure Drop".

**Design Appraisal** - A procedure by which a certifying authority, appointed by the purchaser, appraises the design parameters of the equipment and/or materials they are buying. The supplier shall submit drawings, calculations, and documents as required to the CA, in conjunction with those normally required for review and acceptance by the purchaser.



**Diaphragm** - A round, thin, flexible sealing device secured and sealed around its outer edge – and sometimes around a central hole in the diaphragm – with its unsupported area free to move by flexing.

**Differential Pressure** - The difference in pressure across a valve in a pressurized line. The difference in pressure between any two points in a pressurized system under flowing conditions.

**Dip Tube** - Extending the blowdown valve on large gate valves requires a tube that is located inside of the valve. This tube is called the “dip tube” and extends through the bonnet to the bottom of the body cavity.

**Disc** - The closure element of a globe angle or small regulator valve. The disc (sometimes referred to as a “valve”, “poppet”, or “plug”) moves to and from the seat in a direction perpendicular to the seat face. Depends on stem force for tight shutoff.

**Distribution Line** - Pipeline which distributes gas to the service lines of individual consumers. Usually it is small in diameter (6” and under) and low pressure (under 150 psi).

**Dot Regulations** – Department of Transportation A code of federal regulations setting forth minimum safety requirements for the transportation of hazardous gases or liquids by pipeline

**Double block and bleed** - The capability of a valve under pressure to obtain a seal across both the upstream and downstream seat rings and to have its body cavity bled down to atmospheric pressure.

**Double Piston Effect (DPE)** - Principle The sealing principle of GROVE® ball valves whereby line pressure is used on both upstream and downstream floating seats to affect a dead-tight seal simultaneously on both sides of the ball. With the DPE seat configuration, when the upstream seat leaks, the pressure entering into the body cavity acts on the downstream seat, which, being of the DPE design, is then pushed against the ball, and the valve seals in both directions.

**(DPDT) Double-Pole Double-Throw** - Related to electrical switches.

**(DPST) Double-Pole Single-Throw** - Related to electrical switches.

**Drain plug** - A fitting at the bottom of a valve, the removal of which permits draining and flushing the body cavity.

**Drive Pins** - The pins that fit into the bottom of a ball valve stem and engage corresponding holes in the ball. As the operator turns the stem, the drive pins turn the ball.





**Droop** - A drop in set (outlet) pressure of a regulator or control valve due to the travel of its valve or poppet as the required flow increases from low to maximum. A slight change in the control spring length due to the valve travel will result in spring force variations, translating into a change of set (outlet) pressure.

**Dry Lube** - Dry-film molydisulfide applied as a coating to sliding or rotating parts to reduce frictional drag. After application, the film is baked in an oven at high temperature.

**“DU” Bearing** - A bearing consisting of bronze impregnated with Teflon® (TFE) resin which is lead powder-bonded to a low-carbon steel backing.

**Durometer** - An instrument for determining the hardness of synthetic rubber or elastomeric materials, usually on the Shore A scale. Also the unit of hardness: e.g., 90-Durometer Shore A.

**Dye Penetrant Inspection** - See “Liquid Penetrant Inspection”.

**Eccentric** - Not having the same center.

**Elastomer** - A natural or synthetic material. Used in synthetic rubber parts such as O-rings.

**Elbow** - A fitting used for changing direction in a run of pipe or tubing. See “Ell”, “Street Ell”.

**Electroless Nickel Plating** - A plating process that requires no external electrical power and is the result of a chemical reaction between the part and the plating solution. A uniform consistent deposit and plating rate can be produced by controlling and adjusting the chemistry of the plating bath.

**Ell** - A pipe or tubing fitting that has the shape of an L. See “Elbow”.

**Emergency Seat Seal** - To obtain tight shutoff in an emergency situation, a sealant can be injected into a specially designed groove in the seat rings. Available for most ball valves and gate valves.

**(EMO) Electric Motor Operated** - The actuation of a valve by electric motor. See “Power Operator”.

**End Bevel** - Weld end preparations for butt welding. Governed by ASME B31.4 and B16.25.

**End Connection** - The type of connection supplied on the end of a valve that allows it to be installed in a pipeline. Weld end, flanged end, screwed end.



**Erosion** - The mechanical wearing away of a metal surface or part due to fluid impingement. The presence of entrained solid particles accelerates this process.

**ESDV Emergency Shutdown Valve** - A valve or a system of valves that, when activated, initiate a shutdown of the plant, process, or platform they are tied to.

**Expanding Gate Valve** - A gate valve comprised of a separate gate and segment that, as the valve operates the gate and segment, move without touching the seats, permitting the valve to be opened and closed without wear. In the closed position, the gate and segment are forced against the seats. Continued downward movement of the gate causes the gate and segment to expand against the seats. When the valve reaches its full open position, the gate and segment seal off against the seats while the flow is isolated from the valve body.

**Explosion Proof** - A statement associated with a design that is capable of passing certain specified tests after exposure to a potentially explosive environment. Generally, these tests must be referenced to a particular specification. This is especially important for electrical devices, such as solenoids and switches.

**Export Packing** - Special packing and crating that is required for export shipping. Includes sealing against a salt atmosphere (sea air).

**Extended BDV** – Blowdown Valve Used on buried valves where the drain plug is inaccessible. Instead, a line is piped above grade, terminating in a small valve. Line pressure is used to blow out condensates and other material which settles out in the bottom of the body cavity.

**Extension Stem** - The equipment applied to buried valves to provide above grade accessibility to operating gear, blowdown, and seat sealant systems.

**External Coating** - Coating applied to protect valves against various environments – sea air, salt water, earth burial, and normal air exposure.

**(FAS) Free Alongside** - Term used for ocean shipment. Vendor pays transportation only to shipping dock alongside vessel.

**Fabricated Valve** - One in which the body and hub parts are not cast, but rather are formed from plate or pipe and then welded or bolted together.

**Face-to-Face** - The overall dimension from the inlet face of a valve to the outlet face of the valve (one end to the other). This dimension is governed by ASME B16.10 and API 6D to ensure that such valves are mutually interchangeable, regardless of the manufacturer.



**Facing** - The finish of the contact surface of flanged fittings.

**Fail-Safe Valve** - A valve designed to operate to a preferred position (open or closed) in order to avoid an undesirable consequence in a piping system. Refer to ESDV and BDV.

**Fatigue Assessment** - Fatigue resistance verification of a component subjected to a number of operating cycles.

**Female Thread** - An internal screw thread designed to mate with a component having male (external) threads of the same size and type.

**(FE) Flanged End** - See “RF”, “RTJ”.

**(FEA) Finite Element Analysis** - Computerized method of analyzing complex shapes by organizing the shapes into a series of smaller elements that can be more accurately analyzed to determine whether or not components are suitable for their intended purpose.

**(FERC) Federal Energy Regulatory Commission** - US government agency that has the final approval of new pipelines, right of ways, etc.

**Field Serviceable** - A statement indicating that normal repair of the valve or replacement of operating parts can be accomplished in the field without returning the valve or part to the manufacturer.

**Fire Gate** - A gate or ball valve that is positioned in a pipeline at the entrance to a compressor station. This valve is closed in case of fire in the compressor station. Closing the valve prevents the gas in the pipeline from feeding the fire.

**Fire-Safe** - A statement associated with a valve design that is capable of passing certain specified leakage and operational tests after exposure to fire. Must be referenced to a particular specification. See API Spec 6FA and BS Spec 6755.

**Fitting** - Any device used for connecting elements in fluid lines, e.g., elbows, tees, nipples, unions, flanges, etc.

**Flange** - A formed pipe fitting consisting of a projecting radial collar with bolt holes to provide a means of attachment to piping components having a similar fitting. The end piece of flanged-end valves.

**Flat Face (FF)** - A flange surface in which the gasket sealing area is the entire surface from the ID to the outside edge. Usually used for class 125 cast iron valves.



**Floating Ball** - A ball valve having a non-trunnion mounted ball. The ball is free to float between the seat rings and has higher torque when compared to a similar size trunnion mounted valve.

**Flow** - A fluid in motion in a conducting line.

**Flow Coefficient** - The number of gallons of water per minute that will flow through a valve with a pressure drop of 1 psi. Also referred to as the CV of the valve.

**Flow, Laminar** - The flow of a viscous fluid in which the fluid moves in parallel layers with a fixed velocity gradient from the centerline to the containing walls of the conduit. Sometimes referred to as “streamline” flow.

**Flow Meter** - An instrument used to measure flow rate or total flow or both.

**Flow Rate** - The volume or weight of a fluid passing through a pipeline or conductor per unit of time, e.g., 3000 b/d of oil; 4 MMcf/hr of gas.

**Flow, Turbulent** - The random flow of a fluid in which the velocity at a certain point in the fluid varies irregularly.

**Fluid** - Any non-solid substance that can be made to flow. Both liquids and gases are fluids.

**FOB** - Free Onboard Transportation charges are absorbed by vendor to the FOB point. Usually a shipment is FOB Factory, in which case, title, and transportation charges pass to the customer when it leaves the factory.

**Force** - The intensity of an influence tending to produce motion, distortions, or change of shape. The product of unit force (psi) and the area over which it acts. Usually expressed in pounds.

**Forging** - A part that is formed by heating followed by hammering, rolling, or applying other compressive forces to create a specific shape.

**Friction**- The resistance to motion between two contacting surfaces or substances. Friction also is developed between a flowing fluid and the inner wall of the conducting pipe, resulting in a drop of pressure.

**Full Bore** - See “Full Opening”.

**Full Opening** - Describes a valve whose bore (port) is nominally equal to the bore of the connecting pipe. See “Venturi Valve”.

**Full-Penetration Weld** - Describes the type of weld wherein the weld metal extends across the entire wall thickness of the joint.



**Galling** - The tearing of metal when two elements rub against each other. Usually caused by lack of lubrication or extreme contact pressure.

**Gas** - A compressible fluid such as air, hydrogen, nitrogen, etc.

**Gasket** - A seal or packing placed between mechanical joints (such as flanges) to prevent the escape of the flowing medium.

**Gate** - The closure element of a gate valve.

**Gate Valve** - A straight-through pattern valve whose closure element is a wedge or parallel-sided slab, situated between two fixed seating surfaces, with means to move it in or out of the flow stream in a direction perpendicular to the pipeline axis.

**Gauge, Pressure** - An instrument, usually with a threaded connection, for measuring and indicating the pressure in a piping system at the point at which it is connected.

**Gland (or Gland Bushing)** - That part of a valve which retains or compresses the stem packing in a stuffing box (where used) or retains a stem O-ring, lip seal, or stem O-ring bushing. Sometimes manually adjustable. See "Packing", "Stuffing Box".

**Gland Plate** - The plate in a valve that retains the gland, gland bushing, or stem seals, and sometimes guides the stem.

**Globe Valve** - A valve whose closure element is a flat disc or conical plug sealing on a seat which usually is parallel to the flow axis. The tortuous flow path produces a relatively high pressure loss.

**(GO) Gear Operated** - The actuation of a valve through a gear set which multiplies the torque applied to the valve stem. See "BGO - Bevel Gear Operator", "MGO - Manual Gear Operator".

**Graphite** - Flexible carbon material used to make gaskets and packing. The gaskets may be flat graphite sheet or have metal inserts for added strength. The packing is a combination of lattice braided rings used as anti-extrusion or wiper rings and die-formed rings which are compressed to affect the seal.

**Grease Fitting** - A fitting through which lubricant or sealant is injected.

**(HWO) Handwheel Operated** - A valve on which the handwheel drives the stem directly to operate the valve.

**Hard Facing** - A surface preparation, such as detonation gun or high velocity oxygen flow (HVOF), in which an alloy is deposited on a metal surface, usually by weld overlay, to increase abrasion and/or corrosion resistance.



**Head** - The height of an open column of liquid above a given datum, expressed in linear units; e.g., feet of water, inches of mercury, etc. It is another way of expressing pressure.

**Header** - See “Manifold”.

**Heat Analysis** - A chemical analysis, conducted by the foundry immediately prior to pouring, which measures the exact chemical composition of a particular batch of molten metal. Does not include analysis of physical properties. See “Mill Test”.

**Heat-Treatment** - Describes any process or procedure by which the internal structure of steel is altered by heating to produce desired physical characteristics. This is usually accomplished by furnace heating followed by controlled cooling.

**Heat Treatment Charts** - Furnace charts providing a temperature versus time record of the heating and cooling cycle, required by a specific heat treatment process for a particular furnace load of steel or steel parts.

**Holiday** - An imperfection or bare spot in a coating or plating.

**Hot Tapping** - The process by which a pipeline, under pressure, is cut into to provide a side outlet. A flanged fitting is saddle-welded to the pipeline and a full port valve bolted to the flange. The hot tapping machine, bolted to the outboard valve flange, is operated through the open valve. After cutting out a circular piece from the pipe wall, the tapping machine is removed and the valve closed.

**Hot tears** - A defect occurring in castings caused where partially solidified or weak, newly solidified sections are subjected to a pull resulting from the contraction of thinner parts that have solidified earlier. A hot tear is an intergranular failure.

**Hubs** - The end connection tubes on a gate valve.

**Huey test** - A corrosion resistance test for stainless steel, most useful for predicting resistance to intergranular corrosion.

**Hydraulic** - Pertaining to, or using, water, oil, or other liquids.

**Hydraulic Motor Actuator (or Operator)** - A device by which rotation of a hydraulically powered motor is converted into mechanical motion.

**Hydraulic Seats** - The movement of the seats in a valve that are controlled by using water, oil, or other liquids under pressure.

**Hydrostatic Test (or Shell Test)** - A test in which a valve is completely filled with water and pressure tested. Used for conducting proof pressure testing.



**(IBBM) Iron body, bronze mounted** - common term for valves with cast iron body and bonnet and bronze trim (seating surfaces, stem, bushings).

**(ID) Inside Diameter** - The measurement of the inner diameter of a circular part.

**(IDS) Instrument Data Sheet** - A table summarizing data such as service, valve size, supply pressure, etc., necessary in prescribed pressure steps.

**Incremental Seat Test** - The leakage testing of valve seats in an assembled valve by increasing the applied pressure in prescribed pressure steps.

**Inertia** - The property of a body or mass which resists a change in velocity.

**Inlet Port** - The end of a valve which is connected to the upstream pressure zone of a fluid system.

**Inner Seat Ring** - The inner part of a two-piece valve seat assembly.

**Inside-Out Air Seat Test** - A pressure test that can be performed only on a trunnion mounted ball valve with DPE seats. By closing the valves and pressurizing the body cavity, all of the seals in an independent seating ball valve can then be pressure tested.

**In Situ Maintenance** - To maintain or repair a product in its original place, such as a top entry ball valve or regulator.

**Internal Pressure Relief** - A self-relieving feature in non-DPE seating valves that automatically relieves excessive internal body pressure caused by sudden changes in line pressures. By means of the piston effect principle the excessive body pressure will move the seat away from its seating surface and relieve it to the lower pressure side.

**(ISO) International Standards Organization** - An organization that sets minimum international standards for a wide variety of items manufactured and used in pipeline services.

**ISO 14313** - The ISO specification for pipeline valves.

**(ISRS) Inside screw, rising stem** - common term for any valve design in which the stem threads are exposed to the fluid below the packing and the stem rises up through the packing when the valve is opened.

**Key Stop** - A method of restricting the travel of a ball valve from fully open to fully closed. The stem key bears against the ends of an arc machined in the adapter plate.

**(LNG) Liquefied Natural Gas** - Natural gas in the liquid state. For the gas to remain liquefied, the temperature must be maintained in the cryogenic region.



The liquid occupies far less volume than an equivalent volume of gas and it can be readily transported by ship and stored ashore in insulated tanks to await regasification.

**(LPG) Liquid Petroleum Gas** - Gases such as butane or propane in the liquid state. LPG, under relatively low pressure, remains a liquid at normal ambient temperature.

**Lantern Ring** - See “Chevron Packing”.

**Lifting Lugs** - Lugs provided on larger ball, gate, and check valves, for lifting and positioning valves. Also called lifting eyes.

**Limit Switch** - An electrical device providing a signal to a control system to prevent the travel of the valve past a predetermined point. Usually a component of a valve operator.

**Line** - A pipe, tube, or hose for conducting fluids.

**Lip Seal** - A circular seal ring of U-shaped cross section encompassing an elastomeric O-ring which provides resiliency and ensures a seal at the inner and outer lips of the U.

**Liquid Penetrant Inspection** - An NDE method of detecting the presence of surface cracks and surface imperfections in welds or castings through use of a special red dye.

**Lock-Up Pressure** - The differential pressure required to produce tight shutoff in a regulator. It is usually a few psi.

**Locking Device** - A mechanism provided on valve operators to prevent unauthorized operation or tampering.

**Lube Seats** - Seats that are equipped with a lubricant injecting system

**(MAOP) Maximum Allowable Operating Pressure** - Determined in accordance with piping codes, DOT regulations, etc.

**Magnetic Particle Inspection** - An inspection procedure for detecting surface cracks in welded areas through the use of fine iron particles in an electrical field.

**Male Thread** - The external thread on pipe, fittings, or valves used in making a connection with mating female (internal) threaded parts.

**Manifold (or Header)** - A common pipe or chamber having several lateral outlets.





**Mass Spectrometer** - An instrument used for sorting streams of electrified particles in accordance with their different masses by means of deflecting fields. The instrument can produce a photographic or graphic record of each compound and the percentage of the compound. Most commonly used in analyzing petroleum and steel products.

**(MDS) Material Data Sheets** - The material data sheets define the minimum requirements for the required materials, i.e., chemical requirements, manufacturing, qualification of supplier, mechanical testing and properties, non-destructive examination, repair, marking, and certification.

**Mechanical Seal** - In a valve, a shutoff that is accomplished by a mechanical means rather than with fluid or line pressure. The wedging action of a gate against the seats or the seat springs pushing the seat against the ball or gate are examples of mechanical seals in a valve.

**Metal-to-Metal Seal** - The seal produced by metal-to-metal contact between the sealing face of the seat ring and the closure elements, without benefit of a synthetic seal.

**Meter Prover** - A system used to check or “prove” a flow meter. A close-fitting sphere is launched into a pipe of known inside diameter. The flow medium pushes the sphere through a measured length of pipe between two sphere detection devices. Knowing the transit time and the exact volume between the stations, a flow rate is calculated and compared with the meter reading.

**Meter Run** - A section of pipeline in which a meter is installed to measure the volume of fluid passing through the line.

**(MGO) Manual Gear Operator** - A gear operator that is operated manually (with a handwheel).

**Mill Certificates** - Certificates, provided by the steel mill, indicate the chemical analysis and physical properties of a specific batch of steel. “Mill Certs” are usually required only for pressure containing parts. The customer's need for such “Mill Certs” must be made known when the order is first placed, otherwise is it not possible to trace a valve part back to the mill. See “Heat Analysis”.

**Mill Test** - All tests required by the material specification. Usually includes both the heat analysis (chemical) and the physical properties, and sometimes impact tests.

**Mill Test Reports** - See “Mill Certificates”.

**MMCF** - An abbreviation for “million cubic feet” used to designate gas volume and gas flow rates in pipelines (MMcf/d or MMcf/hr).



**(MO) Motor Operated** - See “Power Operator”, “EMO”.

**Modulus (or Coefficient) of Elasticity** - The ratio between a force per unit area (stress) that acts to deform a body and the corresponding fractional deformation (strain) produced by the stress.

**Mold** - A hollow cavity (frequently in packed sand) for giving a desired shape to a material in a molten or plastic state. Used in making metal castings.

**Monitoring (or Monitor Service)** - A field procedure whereby two valves – usually regulators – are installed in series and adjusted in such a manner that, should the primary regulator fail, the standby regulator will automatically take over at a slightly higher pressure setting.

**(MSS) Manufacturers Standardization Society of the Valve and Fitting Industry** - A technical association of valve, fitting, and actuator manufacturers that writes standards and practices for the valve and fitting industry. Recommendations of this society are advisory only.

**(MWP) Maximum Working Pressure (or CWP – Cold Working Pressure)** - The maximum working pressure (pounds per square inch) at which a valve can be operated. The maximum working pressure for various pressure classes are defined by ASME B16.34 or API 6A.

**NACE** – National Association of Corrosion Engineers This technical association publishes papers, articles, and standards on all aspects of corrosion and has written the definitive standard for valve materials for sour gas service.

**(NDE) Non-Destructive Examination** - See “Non-Destructive Tests”.

**Needle Valve** - A type of small valve, used for flow metering, having a tapered needlepoint plug or closure element and a seat having a small orifice.

**(NEMA) National Electrical Manufacturers Association** - An association that has set up guidelines for the manufacture of electrical equipment. Generally applicable to specifications for switches, etc., for electric operators.

**Nipple** - A short length of small size pipe, threaded on both ends. Used on end connections of screwed-end valves and in small size piping systems.

**Nitrogen/Helium Test** - A pressure test conducted using nitrogen or helium (inert gases) instead of air, water, or other gases to prevent any danger of fires or explosions. Generally specified by the purchaser when buying a valve or regulator product.

**Non-Destructive Tests** - Inspection tests that are not destructive to the valve structure or function. See “Radiographic Inspection”, “Liquid Penetrant Inspection”, “Magnetic Particle Inspection”, “Ultrasonic Inspection”.



**Non-Rising Stem** - A gate valve having its stem threaded into the gate. As the stem turns, the gate moves but the stem does not rise. Stem threads are exposed to line fluids.

**Normally Closed Solenoid Valve** - An electrically operated valve whose inlet orifice is closed when the solenoid coil is not energized. Energize to open. See “Solenoid Valve”.

**Normally Open Solenoid Valve** - An electrically operated valve whose inlet orifice is open when the solenoid coil is not energized. Energize to close. See “Solenoid Valve”.

**(NPS) Nominal pipe size** - Dimensionless number used to indicate sizes of pressure pipe and valves - used interchangeably with valve size in inches.

**(NPT) National Pipe Tapered** - A uniform standard governing the dimensions of tapered pipe threads.

**(OCMA) Oil Companies Materials Association** - An association of British oil companies which has written a standard for fire-safe testing of soft-seated valves. See “Fire-Safe”.

**(OD) Outer Diameter** - The measurement of the outermost diameter of a circular part.

**Oldham Coupling** - A double slider connection used to connect shafts.

**O-Ring** - An elastomeric or synthetic seal ring of circular cross section.

**Operating Time** - The time required for a power operator to stroke the valve from a fully open to fully closed position or vice versa.

**Operator** - A device that converts manual, hydraulic, pneumatic, or electrical energy into mechanical motion to open and close a valve. See “Power Operator”, “EMO”, “GO”, “HWO”, “MGO”, “MO”.

**(OS&Y) Outside Screw and Yoke** - A valve in which the fluid does not come in contact with the stem threads. The stem sealing element is between the valve body and the stem threads.

**Outer Seat Ring** - The outer metal piece of a two-piece seat ring unit. See “Inner Seat Ring”.

**PSI (psi)** - An abbreviation for “pounds per square inch”. The force per unit area exerted against a resisting body.

**Packing**- The deformable sealing material inserted into a valve stem stuffing box, which, when compressed by a gland, provides a tight seal about the stem. See “Gland”, “Stuffing Box”.



**Packing Gland** - See "Gland".

**Pattern** - A duplicate or copy, usually wooden, of a part to be cast. Used to form the mold into which molten metal is poured.

**Peak Shaving** - When daily usage of natural gas is charted on graphs, it will show high peaks (of usage) during the winter months. These peaks can be "shaved" (averaged out) when the daily consumption is augmented with standby supplies of synthetic natural gas, propane, or methane.

**Phenolic Coating**- A thermo-setting resin applied to valve interiors and/or exteriors to inhibit corrosion. A plastic material.

**PIG (Pipeline Inspection Gauge)** - A device, closely conforming to the pipe bore, which is forced through a pipeline to clean the pipe of all foreign material and debris. The valves in a pipeline that will be pigged must be through-conduit, full port; otherwise the pig will not pass through them.

**Pilot** - A spring-loaded pressure regulator used to control the pressure and flow of other larger pressure regulators or instruments.

**Pilot-Operated Regulator** - A regulator that is controlled by a second small-volume, high-accuracy regulator or pilot. This arrangement has the advantages of improving performance reducing the effects of unbalanced pressure and droop. The number of possible applications also are increased since a wide range of pilot configurations are feasible.

**Pinhole** - Numerous small gas holes at the surface or just below the surface of castings, generally occurring in the thicker parts of the casting as a reduction in the solubility of gases in the metal as the metal cools.

**Pinion Shaft** - The external input shaft of certain gear operators which drives the internal reduction gearing. The pinion shaft can accept a handwheel or power operator.

**Pinion Shaft Extension** - On a buried valve, the gear operator pinion shaft must be extended above grade to permit the valve to be operated.

**Piston Effect** - The sealing principle involved in utilizing line pressure to affect a seal across the floating seats of some valves.

**Pitch and Lead** - Pertaining to screw threads, the pitch refers to the measurement between adjacent threads. The lead refers to the distance the screw advances in one complete revolution. Worm gears of gear operators also are identified by pitch and lead. Speed of operation and torque required are related to pitch and lead.



**Plastics** - A broad classification covering a variety of non-metallic, synthetic, or organic materials capable of being molded or formed into desired shapes. Also used as a protective coating for valves.

**Plug** - The rotating closure element of a plug valve. Also, a threaded fitting used to close off and seal an opening into a pressure-containing chamber, e.g., pipe plug.

**Plug Valve** - A quarter-turn valve whose closure element is usually a tapered plug having a rectangular port.

**(PMI) Positive material identification** - a method for cross checking the identity of a piece of material, often using a portable spectrometer, usually with x-rays (TN 9266, nuclear analyzer) or a welding arc (Arc Met 900, optical spectrometer).

**Pneumatic** - Pertaining to, or using, air or gas.

**Porosity** - A defect found in castings or welds consisting of gas bubbles or voids in the solidified metal.

**Port**- See "Bore".

**Position Indicator** - Any external device that visually indicates the open and closed position of a valve. See "Stem Indicators".

**Power Operator** - Powered valve operators are of the following general types: electric motor, pneumatic or hydraulic motor, and/ or pneumatic, or hydraulic cylinder. Operators can either be adapted directly to the valve stem or side-mounted on existing gear or scotch yoke operators.

**Pressure** - See "PSI".

**Pressure Differential** - See "Differential Pressure".

**Pressure Drop** - Decrease in pressure along the direction of flow in a piping system caused by fluid friction, restrictions, and change-of direction fittings. Pressure drop is related to velocity, specific gravity, viscosity, and the size and roughness of the pipe interior. See "Differential Pressure".

**Pressure-Reducing Regulator** - Regulator designed to control downstream pressure. See "Regulator".

**Pressure Switch** - A switch (usually electric) activated by a rise or drop in pressure. A transducer.

**Pressure-Temperature Ratings** - The maximum allowable working pressures at specified temperatures. For steel valves, the ratings are defined by "classes"



and found in ASME B16.34. For iron and bronze valves, the ratings are defined in the applicable MSS specifications.

**Pressure Test** - A test using specified pressures of liquid or gases, which can be used to check the sealing, integrity, design standards, etc., of a particular product.

**Product Analysis** - A verification conducted by the steel manufacturer to assure that the chemical composition of received material coincides with the heat analysis and with requirements of the applicable specification.

**Product Standardization** - The process by which purchasers ensure consistency of a product's quality by the approval of the vendors' standardized documentation. This is normally used as the basis for blanket purchase agreements.

**Proof Pressure** - A hydrostatic test pressure, usually 1-1/2 times the rated working pressure, applied to an assembled valve to verify the structural integrity of the pressure-containing parts. Synonymous with hydrostatic shell test. (Ref. API 6D).

**Protective Sleeves** - A circular “pipe-like” sleeve inserted in place of the ball and seats of a top-entry ball valve. This protective sleeve remains in place inside the valve during valve installation and ultimate pigging of a pipeline to clear debris from the line before placing the pipeline into service. Once the pipeline has been purged of all debris, the protective sleeve is removed entirely from the ball valve cavity, and operating trim (i.e., ball and seats) is then installed for normal service conditions.

**Pulsation** - Rhythmical throbbing or vibrating. In pipelines, a flow or pressure oscillation that is identically repeated in every fixed time interval. Pulsation is an inherent characteristic of reciprocating gas compressors and reciprocating liquid pumps. Pressure and flow pulsations interact with piping systems to cause vibration, metering errors, and potential equipment damage.

**Pump** - A rotary or reciprocating device using mechanical energy to propel liquids through pipelines or to draw liquids from tanks or sumps by suction.

**Pump Control Valve** - A ball valve that is not meant for on-off service, but whose specific function is to control flow and prevent cavitations in pumps on liquid pipelines.

**Pups** - See “Transition Piece”.

**Qualification Test** - An investigation, independent of a purchasing function, that is performed on a product to determine whether or not the product conforms to all of the requirements of a particular specification. This is



generally done by a third-party independent to qualify a product for a specific application.

**Quality Assurance** - Planned regular and/or preventive actions which are used to ensure that materials, products, or services will meet specified requirements.

**Ra** - Abbreviation for "arithmetic average roughness height" - the measure of the roughness of a surface expressed in microinches. The higher the number, the rougher the surface. Used to designate the desired surface finish for end flange raised faces.

**Radiographic Inspection** - An X-ray NDE procedure for locating flaws in welds, casting, and fabricated parts.

**Ratchet Drive** - A shaft or valve that is operated by means of a ratchet mechanism. The ratchet delivers an intermittent stepped rotation through a gear in one direction only.

**Reduced Port (or Reduced Bore)** - See "Venturi Valve".

**Regular Port Valve** - A term usually applied to plug valves. The regular port of such a valve is customarily about 40% of the line pipe area. It corresponds to a Venturi or reduced-bore valve of the same nominal pipe size. Venturi ball valves often are a logical alternative to plug valves with advantages in price torque and low maintenance.

**Regulator** - A throttling valve that exercises automatic control over some variable (usually pressure). Not an on-off valve.

**Relief Valve** - A quick-acting, spring-loaded valve that opens (relieves) when the pressure exceeds the spring setting. Often installed on the body cavity of ball and gate valves to relieve thermal overpressure in liquid services. See "BRV" and Section 2.

**Remote Control** - The operation of a valve or other flow-control device from a point at a distance from the device being controlled. Can be accomplished by electrical, pneumatic, or hydraulic means.

**Resilient Seat** - A valve seat containing a soft seal, such as an O-ring, to ensure tight shutoff.

**(RF) Raised Face** - The raised area of a flange face which affords a seal with a mating flange face by means of a flat gasket of the same diameter as the raised face.

**Rim pull** - The force required at the edge of the handwheel to generate the required torque at the center of the handwheel.



**Rising Stem** - A valve stem that rises as the valve is opened.

**Rising Stem Ball Valve** - A single-seated ball valve that is designed to seal by using the valve's stem to mechanically wedge the valve's ball into a stationary seat, affecting a bubble-tight seal. The valve's stem operates through a guide sleeve assembly that guides the stem through a quarter turn of rotation as the stem is raised or lowered by a handwheel (or actuator). The mechanical action of the stem moves the ball away from the seat prior to the 90-degree rotation of the ball. The design provides lower operating torques and longer seat life while assuring bubble-tight shutoff.

**Road Box** - A concrete or metal box with a removable cover, enclosing and providing access to valves installed in buried lines alongside roads or streets. The valves are operated by removing the box cover and inserting a long-handled T wrench which engages a 2" square nut attached to the valve stem or to the pinion shaft of geared valves.

**Rockwell Hardness Number** - A numerical expression of the hardness of a metal as determined with a Rockwell Hardness Tester. There are several hardness scales. The most commonly used are the Rockwell B scale for soft metals and the Rockwell C scale for hard materials.

**(RPM) Revolutions Per Minute** - Rotational speed, turns per minute. For example, the RPM delivered by a power operator to the pinion shaft of a gear operator.

**(RTJ) Ring-Type Joint** - A flange connection using a specially shaped soft metal ring as a gasket. Generally used on high-pressure valves and not widely used in the pipeline industry.

**Rupture Disc (or Blowout Disc)** - An emergency overpressure relief device, a relatively thin diaphragm designed to burst at a specified pressure. It cannot be reset, but must be replaced after rupture event.

**Safety Valve** - A quick-opening, pop-action valve used for fast relief of excessive pressure.

**Schedule** - A system for indicating the wall thickness of pipe. The higher the schedule number, the thicker the wall for a certain pipe size.

**Scotch Yoke Operator** - A quarter-turn operator for use on quarter-turn valves using a scotch yoke mechanism rather than gears. The scotch yoke has a torque output at the beginning and end of its stroke that is generally twice the magnitude of the torque output in the center of its stroke.

**Screwed Ends** - Internally threaded end connections supplied on some valves. Usually tapered pipe threads. See "NPT".





**Seal, Dynamic** - A sealing element used between parts that have relative motion, e.g., stem seals, seat seal O-rings, etc.

**Seal, Static** - A sealing element used as a gasket between two nonmoving parts, e.g., valve bonnet O-rings, ball valve body O-rings, flange gaskets, etc.

**Seal weld** - A weld that does not contribute anything to the mechanical integrity of an assembly, but is made purely to seal or prevent leakage from, for instance, a threaded joint.

**Seat** - The part of a valve against which the closure element (gate, ball) affects a tight shutoff. In many ball valves and gate valves, it is a floating member usually containing a soft seating element.

**Self-Relieving** - The process whereby excessive internal body pressure, in some valves, is automatically relieved into either the upstream or downstream line by forcing the seats away from the closure elements.

**Separator** - A special tank used to separate gas from oil in some crude oil gathering systems.

**Short Gate** - A gate valve wherein the seat rings contact the gate only in the closed position. Such valves are not through-conduit, as the gate is completely withdrawn from the flow area in the open position.

**Short-Pattern Valve** - A valve with face-to-face dimensions less than the API 6D standard.

**Shut-off Valve** - A valve designed only for on/off service. Not a throttling valve. Sometimes referred to as a “block valve”.

**Shrinkage** - Internal defect in castings that are internal voids, irregular in shape, caused by volume contraction during solidification. Can be caused by not maintaining a fluid channel to the riser during solidification.

**Slab Gate** - A gate having flat, finely finished, parallel faces as opposed to a wedge gate. Such a closure element slides across the seats and does not depend on stem force to achieve tight shutoff.

**Slam Retarder** - A device to prevent the clapper of a check valve from slamming as it closes upon flow reversal. Hydraulic damping cylinders, rotary vanes, and torsional springs are all used for this purpose.

**Slurry Service** - An application involving a flow medium consisting of small solid particles suspended in a liquid. Coal slurry, consisting of about equal parts of coal and water, is transported by pipeline from coal mines to plants where the coal is dewatered and burned. A specially modified GROVE® B5 ball valve is offered for this service.



**(SNG) Synthetic Natural Gas** - A substitute natural gas made from the by-products of chemical plants and refineries. See “Coal Gasification”.

**Socket End** - An end connection in which a pipe or tube is inserted into a counterbored hole and then brazed or fillet-welded.

**Solenoid Valve** - A small electrically operated valve used in the control piping of powered hydraulic or pneumatic cylinder operators.

**Sour Gas** - Natural gas containing significant amounts of H<sub>2</sub>S. Requires special trim.

**SPDT – Single-Pole, Double-Throw** - See “SPST”.

**Specific Gravity** - The ratio of the weight of a given volume of fluid to the weight of an equal volume of water (if the fluid is a liquid) or to the weight of an equal volume of air (if the fluid is a gas).

**Spool Piece** - See “Adapter Spool”.

**SPST – Single-Pole, Single-Throw** - Refers to the function of an electrical switch often used in the control system of electric valve operators.

**Spur Gear** - The simplest of gears. In a gear set, the pinion and ring gear are aligned on parallel shafts.

**SSIV – Subsea Isolation Valve** - A valve used underwater, generally in a manifold that will close and isolate a particular pipeline or process in an emergency.

**Stem** - A rod or shaft transmitting motion from an operator to the closure element of a valve.

**Stem Indicator (or VPI – Visible Position Indicator)** - A position-indicating rod supplied with gate valves. It extends from the top of the valve stem and serves to indicate the relative position of the gate.

**Stem Nut** - A one or two-piece nut that engages the stem threads of a valve and transmits torque from an operator to the valve stem.

**Stop Collar** - The collar on a ball valve that restricts the ball to 90 degrees of rotation from the fully closed position. See “Key Stop”.

**Stopp (or Stop Off)** - A procedure used in the repair of a pipeline to isolate a section of line in the absence of a shut-off valve. After welding a flanged saddle to the pipe, the line is “hot tapped” and an expanding resilient plug is inserted into the pipe bore. When the repair is completed, the plug is withdrawn and a valve, installed on the saddle flange, is closed.



**Strain Gauge** - An instrument used to measure small or minute distortions caused by stress forces in mechanical components.

**Street Ell** - A 90-degree pipe fitting with male and female threaded ends.

**Stress** - An engineering parameter used in the design of valves. The value of unit force (psi) produced within a material as the result of an applied force or load. Developed stress must be held well below the yield strength of the material.

**Stud** - A bolt, threaded on both ends, often used in bolting together two members, one of which has blind tapped bolt holes.

**Stuffing Box** - The annular chamber provided around a valve stem in a sealing system into which deformable packing is introduced. See “Packing”, “Gland”.

**Submersible Service Underwater or subsea installation** - Valves require special treatment to protect against corrosion and external seawater pressure.

**Surge** - To rise suddenly to an excessive or abnormal value; a transient sudden rise of pressure in a pipeline. Pipeline surges can be positive or negative and are caused most frequently by the sudden closure of a block valve or emergency shutdown of a pump. Surge pressure in excess of the rated capacity of a pipeline can cause ruptures of the piping system. See Section 2.

**Surge Reliever** - A valve designed to relieve pressure surges in liquid pipelines, thus preventing line rupture due to transient pressures exceeding design limits of the pipe. A special flexible tube valve can function as a fast-acting surge reliever.

**Swage** - A tool for bending or forming cold metal to a required shape.

**Sweet Gas** - Natural gas having no significant H<sub>2</sub>S content.

**Swing Check Valve** - A check valve in which the closure element is a hinged clapper which swings or rotates about a supporting shaft. See “Clapper”, “Check Valve”.

**SY – Scotch Yoke** - See “Scotch Yoke Operator”.

**System Engineering** - That engineering approach which deals with the design and integration of multiple components and controls into an assembled piping complex to accomplish a specified function or functions.

**Tee** - A pipe or tubing fitting with a side outlet at right angles.

**Tensile Strength** - The highest tensile stress that a material can withstand before failure or rupture occurs with force being applied in a direction tending to elongate the material.



**Tensile Test** - A test performed on specially machined specimens taken from material in its delivered condition, to determine physical properties, e.g., yield strength, ultimate strength, and percent elongation.

**Tension Test** - See “Tensile Test”.

**Test Certificates** - Documents provided by a manufacturer certifying that required tests were performed.

**Throttling** - The intentional restriction of flow by partially closing or opening a valve. A wide range of throttling is accomplished automatically in regulators and control valves.

**Through-Conduit** - An expression characterizing valves when in the open position, wherein the bore presents a smooth uninterrupted interior surface across seat rings and through the valve port, thus affording minimum pressure drop. There are no cavities or large gaps in the bore between seat rings and body closures or between seat rings and ball/gate. Consequently, there are no areas that can accumulate debris to impede pipeline cleaning equipment or restrict the valve's motion.

**Thrust** - Force applied to a part in a particular direction, e.g., thrust on a valve stem.

**Top Entry** - The design of a particular valve or regulator where the unit can be serviced or repaired by leaving its body in the line and accessing its internals by removing a top portion of the unit.

**Torque** - The turning effort required to operate a valve. Usually expressed in lb/ft and in reference to the stem nut, handwheel, or operator pinion shaft.

**Torque Switch** - An electrical device on a motor operator that cuts off power to the operator when allowable torque is exceeded, thus preventing damage to the valve and/or the operator.

**Torsional Spring** - A coiled spring that exerts a force by twisting about its axis rather than by compression or elongation. The torsional spring in a check valve slam retarder is restrained at one end and fastened to the clapper shaft on the other end. As the clapper opens, the spring resists the motion, creating a closing force. During a rapid decrease in flow rate, the clapper is urged toward the closed position and is virtually closed just prior to the instant of actual flow reversal, thus slamming is avoided.

**Transition Piece** - A length of pipe that is welded to a valve hub or closure. Generally provided by the customer, it serves as a transition from the customer's piping to the valve to compensate for differences in material or size.



**Transmission Line** - A main pipeline transporting oil or gas from wells or storage fields to refineries, loading docks, or distribution companies. Generally, the pipeline is bigger than 6" and the pressure greater than 150 psi.

**Trim** - Commonly refers to the valve's working parts and to their materials.

**Triple Eccentric (or Butterfly Valve)** - A particular design of a butterfly valve where the stem is located behind the disc and below the centerline of the disc, and its cone axis is offset from the centerline of the disc. This particular design is capable of a very tight shutoff at temperatures well above 1000° F (538° C).

**Trunnion** - The part of a ball valve which holds the ball on a fixed vertical axis and about which the ball turns. The torque requirements of a trunnion mounted ball valve are significantly less than for a floating ball design.

**Turns to Operate** - The number of complete revolutions of a handwheel or the pinion shaft of a gear operator required to stroke a valve from fully open to fully closed or vice versa.

**Two-Inch Square Operating Nut** - A nut attached to the valve stem or to the pinion shaft of a gear operator. Valves so equipped are usually situated below grade in road boxes and are operated by long-handled T wrenches.

**U-Cup (Ring Packing)** - A U cross-section ring located in the tail end of certain ball valve seats to retain the grease in an emergency seat seal system.

**(UL) Underwriters Laboratory** - An impartial testing laboratory concerned with the safety of electrical components. Products surviving the tests are included on a certified listing of products by manufacturer. This does not imply UL approval.

**Ultimate Strength** - The stress at which a material will fail. See "Tensile Test", "Burst Pressure".

**Ultrasonic Inspection** - An inspection procedure using high-frequency sound waves to detect voids and imperfections throughout the thickness of metal parts.

**Underground Storage** - The storage of natural gas or other fluids underground.

**Union bonnet** - A type of valve construction in which the bonnet is held on by a union nut with threads on the body.

**Union Connection** - A small three-piece fitting used to join two lengths of pipe. A female piece is installed on each of the two pipe ends and the connection is mechanically sealed by an external nut.



**Vacuum** - A space from which air or gas has been exhausted until its pressure is less than atmospheric pressure, e.g., any pressure below 14.7 psi absolute.

**Valve** - A device that controls the flow of a liquid or gas in a conduit or pipeline.

**Variable Orifice** - A small variable profile valve put in a flowline and used with a pilot to restrict the flow into the pilot and make the pilot more or less sensitive to changing conditions.

**(VDS) Valve Data Sheet** - A data sheet defining the minimum level of a valve design, including the materials, testing, inspection, and certification requirements.

**Velocity** - The speed at which a fluid flows through a line in a specified direction. Usually expressed in ft./sec.

**Vent Plug (or Vent Plug Assembly/Safety Vent Plug)** - A special pipe plug having a small allen wrench-operated vent valve. These special plugs are located at the bottom of most ball valves. With the line valve closed (and under pressure), the body cavity pressure can be vented through this small valve to check the tightness of seat seals or to make minor repairs. Having vented the body pressure, the vent plug can be removed to blow out debris and foreign material or to flush the body cavity. On some gate valves, the vent plug is installed on the bonnet for the sole purpose of venting the body. Such valves have separate drain valves. See "Block-and-Bleed", "Drain Plug".

**Venturi Valve** - A reduced-bore valve. A valve having a bore smaller in diameter than the inlet or outlet. For example, an 8" x 6" x 8" ball valve has 8" inlet and outlet connections, while the ball and seats are 6". The flow through a Venturi valve will be reduced because of the smaller port. Venturi valves often can be economically substituted for plug valves.

**Viscosity** - A measure of the internal friction of a fluid or the resistance of a flow. Two fluids of identical specific gravity may have quite different viscosities.

**(VPI) Visible Position Indicator** - See "Stem Indicator".

**Wall Thickness** - The thickness of the wall of a pressure vessel or the thickness of the wall of a pipe.

**Water Hammer** - The physical effect, often accompanied by loud banging, produced by pressure waves generated within the piping by a rapid change of velocity in a liquid system.

**(WE) Weld End** - The end connection of a valve which is to be installed by welding into the line. To prepare the end bevel, it is necessary to know the wall



thickness and specified minimum yield strength of the connecting pipe. See “End Bevel”.

**Wear Test** - Verification of a component’s resistance under specific wear conditions.

**Weatherproof** - Describes a valve operator or other device that is protected against intrusion of water, sand, dust, or other atmospheric contamination.

**Wedge Gate** - A gate whose seating surfaces are inclined to the direction of closing thrust so that mechanical force on the stem produces tight contact with the inclined seat rings.

**Weld End** - See “WE”, “End Bevel”.

**Weld Neck Flange** - A flanged piping element with a weld neck used in pipeline construction to provide a companion for installation of flanged valves. Also used to convert weld end valves to flanged valves or vice versa.

**Weld Reducer** - A reducing fitting used on weld end piping components to adapt from a large sized pipe to a smaller diameter pipe or vice versa.

**(WO) Wrench Operated** - The operation of a valve by means of a handle or lever. Used on smaller size and lower pressure class valves.

**(WOG) Water-Oil-Gas** - Used in connection with a pressure rating. Thus, 100 WOG indicates the rated pressure is 100 psi in water, oil, or gas service at normal ambient temperatures.

**Worm Gears** - Gears used to transmit motion or power between right-angle shafts when a high-ratio reduction is necessary. The worm is the smaller gear which drives the larger ring gear. Worm threads resemble screw threads and are available in various leads and pitches.

**(WP) Working Pressure** - The maximum anticipated sustained operating pressure applicable to a pipe.

**X-Ray** - See “Radiographic Inspection”.

**Yield Strength** - The limiting stress (psi) beyond which a material will sustain permanent deformation. Up to the yield strength, the material will spring back to its original dimension when the pressure is removed. Often in valves specs, the yield strength will be designated; this allows proper material selection.

**Yoke** - The part of a gate valve that serves as a spacer between the bonnet and the operator or actuator.



## VALVE SPECIFICATIONS

Below is a listing of the basic specifications used in the design and manufacture of valves and fittings.

### **American Petroleum Institute**

**API Q1** Specification for quality programs

**API 6D** Specification for pipeline valves

**API 6FA** Fire test for valves

**API 598** Valve inspection and testing

**API 600** Steel gate valves, flanged and butt welding ends, bolted and pressure seal bonnets

**API 602** Compact steel gate valves - flanged, threaded, welding, and extended body ends

**API 607** Fire test for soft seated quarter turn valves

**API 608** Metal ball valves - flanged and butt welding ends

### **American Society of Mechanical Engineers/ American National Standards Institute**

**ASME/ANSI B16.34** Valves - flanged, threaded and welding end

**ASME/ANSI B16.5** Pipe flanges and flanged fittings

**ASME/ANSI B16.10** Face-to-face and end-to-end dimensions of valves

**ASME/ANSI B16.11** Forged fittings, socket-welding and threaded

**ASME/ANSI B16.25** Butt welding ends

**ASME/ANSI B16.47** Large diameter steel flanges Note: This specification for flanges larger than 24" replaces MSS SP-44 and API 605 with the designations of Series A (MSS SP-44) and Series B (API 605).

**ASME B31.3** Chemical plant and petroleum refinery piping

**ANSI B31.4** Liquid petroleum transportation piping system





**ANSI B31.8** Gas transmission and distribution piping system

**Manufacturers Standardization Society of the Valves and Fittings Industry**

**MSS SP-25** Standard marking system for valves, fittings, flanges and unions

**MSS SP-55** Quality standard for steel castings for valves, flanges, and fittings, and other piping components - visual method

**MSS SP-70** Cast iron gate valves, flanged and threaded ends

**MSS SP-71** Cast iron swing check valves, flanged and threaded ends

**MSS SP-79** Socket-welding reducer inserts

**MSS SP-80** Bronze gate, globe, angle and check valves

**MSS SP-83** Class 3000 steel pipe unions, socket-welding and threaded

**MSS SP-85** Cast iron globe and angle valves, flanged and threaded ends

**National Association of Corrosion Engineers**

**NACE MR0175** Standard material requirements for sulfide stress cracking resistant metallic materials for oilfield equipment.

**British Standards Institute**

**BSI 1414** Steel wedge gate valves (flanged and butt welding ends) for the petroleum, petrochemical, and allied industries  
**BSI 1868** Steel check valves (flanged and butt welding ends) for the petroleum, petrochemical, and allied industries

**BSI 1873** Steel globe and globe stop and check valves (flanged and butt welding ends) for the petroleum, petrochemical, and allied industries

**BSI 5352** Steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical, and allied industries

**International Organization for Standardization**

**ISO 9001/9002** Quality system - Model for Quality Assurance

