



White Paper

Glossary of Valve Terms and Acronyms

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Glossary of Valve Terms and Acronyms

A

ACCUMULATOR TANK: Enclosed volume that contains a compressible fluid (gas) to provide standby energy in the event of loss of system pressure.

ACCUMULATOR, HYDRAULIC: A pressure storage reservoir in which a non-compressible hydraulic fluid is held under pressure to provide standby energy in the event of loss of system pressure.

ACTUATOR: Mechanical, hydraulic, electric or pneumatic device or mechanism used to open, position, or close a valve.

AIR BOUND: Obstructed, as to the free flow of water, because of air entrapped in a high point; used to describe a pipeline or pump in such condition.

AIR RELEASE VALVE: A hydro-mechanical valve designed to slowly vent/release air automatically and continuously from liquid piping systems.

AIR VALVE: Generic name used to describe a family of valves used to control the release and admittance of air to a pipeline or liquid handling system. Common names for specific types include Air Release, Air/Vacuum and Combination.

AIR VENT: An opening in a penstock or other pipeline, covered tank, or well, that allows inflow or outflow of air.

AIR/VACUUM VALVE: A float operated valve designed to exhaust large volumes of air upon pump start up and provide vacuum protection by admitting large volumes of air upon pump shut down or if a column separation occurs.

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.

ALTITUDE-CONTROL VALVE: A valve that automatically shuts off flow when the water level in an elevated tank reaches a predetermined elevation and opens when the pressure on the system side is less than that on the tank side.

AMBIENT TEMPERATURE: Prevailing temperature of the environment immediately surrounding an object.

ANSI: American National Standards Institute-standard development organization responsible for coordinating the work of U.S. standards writing groups with each other and with other national standards organizations. Known as ASA until 1967.

ANTI-BLOWOUT STEM: A valve stem that is made with a shoulder, positively retained by the body or

bonnet (to avoid under certain operating conditions, that the stem could accidentally blow out).

ANTI-SLAM DEVICE: Device used on Air/Vacuum valves to regulate the valve's closure and prevent the valve from being slammed closed during critical operation. Sometimes referred to as a slow closing device, surge check valve or regulated exhaust device.

ANTI-STATIC DEVICE: A spring-loaded component of a pipeline ball valve which provides contact between stem and ball, and stem and body to eliminate static electricity.

API: American Petroleum Institute-organization that develops standards for materials and articles used in the petroleum and gas gathering (production) industry, and also the hydrocarbon-processing industry.

ASME: American Society of Mechanical Engineers - organization responsible for maintaining several codes and large numbers of standards, covering numerous different industries.

ASSE: American Society of Sanitary Engineering – organization responsible for certifying plumbing and mechanical products and is also a third-party certifier for professionals in the plumbing and mechanical industries.

ASTM: American Society for Testing and Materials-organization responsible for maintaining standards covering materials, testing methods, and in some cases such as plastics, the dimensional and manufacturing standards for finished products.

ATMOSPHERIC PRESSURE: External pressure exerted on a body by the atmosphere: 1.0 Bar (14.7 psia) at sea level.

AUSTENITIC STAINLESS STEEL: A 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.

AWWA: American Water Works Association, Inc. – organization responsible for maintaining standards related to water treatment and water and wastewater treatment products.

B

BACKFLOW ACTUATOR: Optional accessory for the Swing-Flex® Check Valve. Provided for opening and holding open the valve disc to allow backflow

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through the line. Used to backwash a line, drain a system or fill a wet well.

BACK PRESSURE: The pressure exerted on the downstream side of a valve.

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 open.

BACKFLOW PREVENTER: Any mechanical device, whether used singly or in combination with other controls, designed to automatically prevent an unintentional reversal or flow in a potable water distribution system.

BACKFLOW: The reversal of flow from that normally intended.

BACKWASHING: The act of flowing clean water backwards through a valve or filter for the purpose of cleaning.

BALL VALVE: A valve that has a spherical, or section of a spherical, closure element that opens and closes by rotating one-quarter turn.

BARE-SHAFT (STEM): A valve supplied without lever or hand wheel, where the end of the stem (shaft) is exposed and ready for others to install their own actuator.

BEARING: A cylindrical machine located in the body hubs that is used to radially support the valve shaft(s).

BELLEVILLE SPRING or BELLEVILLE WASHER: A disc-shaped washer, which provides axial spring force along its own centerline.

BERNOULLI'S LAW: A physical law of hydraulics that states that under conditions of uniform steady flow of water in a conduit or stream channel, the sum of the velocity head, pressure head, and head due to elevation at any given point along such conduit or channel is equal to the sum of these heads at any other point along such conduit or channel plus or minus the losses in head between the two points due to friction.

BEVEL GEAR ACTUATOR: 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.

BHN: Brinell Hardness Number - a dimensionless indicator of material hardness.

BI-DIRECTIONAL: A shut off valve capable of sealing in both direct and reverse pressure.

BLOCK AND BLEED: A valve configuration in which the flow through the valve, from the inlet port to the

outlet port, is blocked, while another small port is provided for the purpose of bleeding down (draining or depressurizing) the cavity in between.

BLOW DOWN VALVE (BDV): A small ball valve that is installed to vent body cavity pressure.

BLOWOFF VALVE: A valve installed in a low point or depression on a pipeline to allow drainage of the line. Also called washout valve.

BODY: The principle pressure containing shell of a valve or fitting.

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.

BONNET: The cover or removable top component of a valve, containing the packing gland and stem opening. Generally, gate and globe valves are considered to have a bonnet.

BRONZE: An alloy of copper and tin. For special purposes other metals such phosphorus, lead, zinc, silicon or aluminum are added. Most bronze alloys resist corrosion.

BSI: British Standards Institution-organization responsible for standards in Great Britain and Northern Ireland.

BUBBLE-TIGHT: A seat leakage condition in which, during the allotted time of the test, no perceptible leakage comes past the seat being tested. Applies to air-under-water testing-the same test using water-under-air is referred to as drop tight.

BUNA-N: Common term for nitrile rubber.

BUSHING: A lining or sleeve of metal or other material inserted into a hole to limit its size, resist wear, or act as a guide.

BUTT WELD: Weld where the adjoining edges to be welded are parallel and facing each other.

BUTTERFLY VALVE: A valve that has a circular disc-shaped closure element that pivots one-quarter turn about its vertical centerline to open and close.

BYPASS: A smaller line containing a valve that comes off a larger line just upstream of a major valve and rejoins the same line just downstream of the valve.

C

CAST IRON: The common term for cast gray iron or iron containing flake carbon in the range of 1.0 to 1.5 %. Cast iron is brittle, exhibiting very little ductility before fracturing.

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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.

CAVITATION: The phenomenon in which the local pressure at a point in a flowing fluid becomes lower than the vapor pressure of the fluid, thus causing small bubbles to form. The bubbles then implode when the local pressure rises again, causing shock waves that are very destructive to the walls of the passageway or the valve trim in the area of the cavitation.

CENTRIFUGAL PUMP: A pump consisting of an impeller fixed on a rotating shaft and enclosed in a casing and having an inlet and a discharge connection. The rotating impeller creates pressure in the liquid by the velocity derived from centrifugal force.

CHAINWHEEL: Device that is shaped like a handwheel but has a chain guide around its periphery either attached to or in place of a handwheel for operating valves higher than a person's reach.

CHARPY TEST: A destructive mechanical test conducted on a precisely machined coupon of steel to measure of the toughness of the steel or its resistance to shock or impact.

CHECK VALVE: A unidirectional valve which is opened by the fluid flow in one direction and which closes automatically to prevent flow in the reverse direction.

CHEVRON PACKING: Packing that consists of stacked rings of molded plastic or fiber, with a V-shaped cross section such that pressure from under the chevron tends to force the edges of the packing ring more tightly against the walls of the packing chamber, thus increasing the seal.

CHEZY FORMULA: A basic hydraulic formula developed by Chezy in 1775 for determining the flow of water in open channels. See Manning Formula, Manning Roughness Coefficient.

CLAPPER: Another name for the disc in a swing check valve.

CLASS: A designation of pressure capability expressed as a dimensionless number. The class rating charts give maximum allowable pressure at a given temperature.

CLOSURE MEMBER: The device or object that is placed into or across an opening in a pressure-retaining body for the purpose of closing it off.

COLD WORKING PRESSURE (CWP): The maximum allowable pressure under non-shock conditions at ambient temperature, typically 125°F (52°C).

COLUMN SEPARATION: Phenomena which occurs when a column of water in a pipeline separates creating a vacuum.

COMBINATION AIR VALVE: Air Valve which combines the function of an Air Release valve with that of an Air/Vacuum valve. Available in both single body and dual body configurations.

COMPANION FLANGE: A pipe flange threaded internally to receive a pipe length and drilled so it may be bolted to another like flanges.

CONTROL VALVE: Valve that has an automatic actuator that responds to signals sent by pneumatic, electrical, or other means for the purpose of controlling or varying the fluid flow in the pipeline.

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

CORROSION: The deterioration of a material due to chemical action or environmental conditions.

CRACKING PRESSURE: The pressure required to lift a check valve disc off its seat.

CROSS CONNECTION CONTROL: The use of assembly, devices, methods and procedures to prevent contamination or pollution of a potable water supply through cross-connection.

CROSS CONNECTION: A connection between two pipes in the same water supply system or between two water supply systems containing potable water.

CRYOGENIC VALVE: A term used to describe valves designed generally to operate below -150°F (-101°C).

CUSHION SWING CHECK VALVE: A Swing Check Valve designed to reduce slamming by providing an external cushion to dampen the disc's closure.

Cv: Flow coefficient expressed as the number of gallons of water that would flow through an opening, such as a valve port, in 1 minute under a differential pressure of 1 psi.

CYCLE: A single complete operation or process returning to the starting point. A valve, stroked from full open to full close and back to full open, has undergone one cycle.

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CYLINDER ACTUATOR: An actuator which converts hydraulic or pneumatic pressure action on a piston within a cylinder into mechanical force which moves the valve or gate closure member.

D

DASHPOT: A device used to dampen and control a motion, in which an attached piston is fitted to move slowly in a cylinder containing oil.

DEEP-WELL TURBINE PUMP: A centrifugal pump adapted for deep well use and consisting of a series of stages. Each stage comprises a set of vanes in a case or bowl, and the number of stages increases with the operating head.

DESIGN PRESSURE: The pressure used in calculating required wall thicknesses, flange ratings, and other variables. Generally, the design pressure is set at a value higher than the operating pressure, to include all the reasonable allowances for surge pressures and variation in operating conditions.

DESIGN TEMPERATURE: The temperature that is used to determine allowable stresses for the purposes of design calculations. Generally, the design temperature is set at a value higher than the operating temperature and includes allowances for upsets and variation in operating conditions.

DIAPHRAGM ACTUATOR: A pressure-operated, spring-opposed diaphragm assembly which positions the valve stem in response to an input signal.

DIFFERENTIAL PRESSURE OR ΔP : The difference between the upstream and downstream pressures.

DIN: Deutsche Industries Norme German national standard organization.

DIRECT ACTING: An actuator in which the actuator stem extends with an increase in diaphragm pressure.

DIRECT PRESSURE: Pressure applied by the flow against the back of the valve closure member and/or opposite the seat end of the valve.

DISC STROKE: The movement of a valve disc from the closed to open position or vice versa.

DISC: The closure member in a gate, globe, check, or butterfly valve.

DISCHARGE HEAD: A measure of the pressure exerted by a fluid at the point of discharge, usually from a pump.

DISTRIBUTION SYSTEM: A system of fittings and fixtures used to convey liquid or gas from one point to another.

DN: Nominal Diameter-standard abbreviation for pipe size used in ISO standards.

DOUBLE ACTING ACTUATOR: Characteristic of a piston or diaphragm system in which the energizing pressure acts on both faces of the piston or diaphragm and operates the system in forward and reverse to open or close.

DOUBLE BLOCK & BLEED (DBB): A single valve with two seating surfaces that, in the closed position, provides a seal against pressure from both ends of the valve with a means of venting/bleeding the cavity between the seating surfaces.

DOUBLE ISOLATION & BLEED (DIB): A single valve with two seating surfaces, each of which, in the closed position, provides a seal against pressure from a single source, with a means of venting/bleeding the cavity between the seating surfaces.

DUAL DISC®: A check valve utilizing two discs. The discs are half circle in shape, hinged on their straight edge and mounted to a hinge pin on the valve's centerline.

DUCTILE IRON: A type of cast iron with special treatment during the casting process to enhance its metallurgical graphite structure to provide carbon nodules and higher mechanical properties and improved ductility similar to steel.

DUROMETER: A device for measuring hardness's of resilient materials.

DUTY CYCLE: Percentage of time a device is allowed to operate over a given period of time. Expressed in percent, it equals time on divided by time off multiplied by 100.

DYE PENETRANT INSPECTION: Also known as Liquid Penetrant Inspection. A non-destructive method of detecting the presence of surface cracks and imperfections through use of a special colored dye.

DYNAMIC TORQUE: Flow-induced valve torque.

E

ECCENTRIC ACTION: The movement of a valve plug or disc which has a pivot axis off center from the seat or body. Allows movement in and out of the seat without rubbing.

ECCENTRIC PLUG VALVE: A quarter turn shut-off valve in which the plug or disc has a pivot axis off center from the valve's seat or body. The Eccentric Action of the disc allows movement of the plug in and out of the seat without rubbing.

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EFFLUENT: (1) A liquid which flows out of a process or confined space. (2) Wastewater or other liquid partially or completely treated, or in its natural state, flowing out of a reservoir, basin, treatment plant, or industrial treatment plant, or part thereof. (3) An outflowing branch of a main stream or lake. (4) An emission of gas.

ELASTOMER: A natural or synthetic elastic material, often used for O-ring seals.

ELECTRIC ACTUATOR: Also known as an Electro-Mechanical Actuator which uses an electrically operated motor-driven gear train or screw to position the actuator stem. The actuator may respond to either a digital or analogue electrical signal.

ELECTROLYTIC CORROSION: Corrosion resulting from stray DC currents in underground pipe.

ELEVATION HEAD: The energy possessed per unit weight of a fluid because of its elevation above some datum.

EMERGENCY SEAT SEAL: A fitting on the valve body through which sealant can be injected to affect a seat seal in an emergency situation.

END CONNECTION: The type of connection supplied on the ends of a valve which allows it to be connected to piping.

END TO END DIMENSION: The dimension from the end of one port to the end of the opposite port of a valve, fitting or pipe.

ENERGY HEAD: The height of the hydraulic grade line above the center line of a conduit plus the velocity head of the mean-velocity water in that section.

EROSION: The mechanical wear of a metal surface or part due to fluid impingement. The presence of entrained solid particles accelerates this process.

EXPANSION JOINT: A pressure tight connection device installed in a piping system to provide for changes in length due to expansion or contraction resulting from changes in temperature.

EXPLOSION-PROOF: Characteristic of a device or enclosure that inherently contains or prevents an explosion.

EXTENSIONS: The equipment applied to buried valves or valves below walkways to provide above grade accessibility to operating gear.

EXTERNAL COATING: Coating applied to protect valves against various arduous environments – sea water/air, etc. (not normally a requirement for corrosion resistant valves).

F

FACE-TO-FACE DIMENSION: The dimension from the face of the inlet port to the face of the outlet port of flanged valves or fittings.

FACING: The finish of the gasket contact surface of a flange.

FAIL SAFE VALVE: A valve designed to fail in a preferred position (open, closed or in-place) in order to avoid an undesirable consequence in a piping system.

FAIL-OPEN: A condition in which a valve or other component that is normally in some position, open, closed, or in between, will open if power or signal is lost.

FAILURE MODE: Upon electric power failure or air pressure loss to the actuator, the valve is operated to a predetermined position (fail open, fail close, fail in last position).

FEEDBACK: Signal indicating the actual position of an element in a control system.

FIRE SAFE: A valve design that is capable of passing a fire test with specified limits on leakage to the atmosphere and downstream after being closed subsequent to fire exposure.

FLANGE: A cast or formed pipe fitting with bolt holes to provide means of attachment to piping components having a similar fitting.

FLANGELESS: A valve that does not have integral line flanges, sometimes referred to as a Lug or Wafer Style valve.

FLAP VALVE: A valve that is hinged at one edge and that opens and shuts by rotating about the hinge.

FLAT FACE: (FF) A flange surface in which the gasket sealing area is the entire surface from the inside diameter to the outside edge of the flange.

FLOAT VALVE: A valve in which the closure to an opening, such as a plug or gate, is actuated by a float to control the flow into a tank.

FLOATING BALL VALVE: A ball valve where the ball is free to float between the seat rings.

FLOW AREA: The total area minus obstructions at a given cross sectional point in a valve.

FLOW CHARACTERISTICS: The curves relating to the percentage of flow versus the closure member travel. Inherent flow characteristics assume a constant pressure across the valve while the installed flow characteristic includes the impact of the system on the valve's performance.

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FLUID: Substance that is characterized by low resistance to flow and the tendency to assume the shape of its container or conduit.

FM: Factory Mutual Association - an organization that certifies products used in fire- or other safety-related industrial installations.

FOOT VALVE: A check valve with an inlet screen placed in the bottom of the suction pipe of a pump, which opens to allow water to enter the suction pipe but closes to prevent water from passing out of it at the bottom end.

FORCE MAIN: A pressure pipe joining the pump discharge at a water or wastewater pumping station with a point of gravity flow.

FORGING: A metalworking process that involves hammering or forming, with or without a die, at hot working temperatures to form a specific shape.

FRICTION LOSS: The head lost by water flowing in a stream or conduit as the result of the disturbances set up by the contact between the moving water and its containing conduit and by intermolecular friction.

FUGITIVE EMISSIONS: Named used by the EPA for the external leakage of hazardous gases from piping components such as valve and pumps.

FULL BORE or **FULL PORT:** A valve or other component in which the seat area has substantially the same cross section and cross-sectional area as the end connections have.

FULL PENETRATION WELD: Describes the type of weld wherein the weld metal extends through the complete thickness of the parts being joined.

G

GALLING: The tearing of metal surfaces when two elements rub against each other. Usually caused by lack of lubrication or extreme contact pressure of materials of a similar hardness value.

GALVANIC CORROSION: Corrosion that occurs where dissimilar metals are in close proximity in an electrolytic solution, such as water. The anode side is the one that loses metal.

GAS: A compressible fluid – such as air, hydrogen, nitrogen, etc.

GASKET: A component whose purpose is to seal a joint between two larger components, softer than the surfaces of the joint being sealed and usually compressed by means of bolting to affect the seal.

GATE VALVE: A valve whose closure member is a gate, wedge, disc or double disc which moves on an axis perpendicular to the direction of flow.

GEAR OPERATED: The actuation of a valve thru a gear set which multiplies the torque applied to the valve stem.

GLAND FOLLOWER: The flange that is used to hold down or retain the gland on a packing chamber.

GLAND or **GLAND BUSHING:** The ring that compresses or retains the packing.

GLOBE VALVE: A valve, originally somewhat globe shaped, in which the closing member is circular in cross section and moves along a line concentric with the seat axis to open and close.

GRADIENT: The rate of change of any characteristic per unit of length, or slope. The term is usually applied to such things as elevation, velocity, pressure. See slope.

GRAPHITE: Flexible carbon material used to make gaskets and packing. The gaskets may be flat graphite sheet or have metal inserts for added strength.

GRAY IRON: Cast iron which has a high carbon content which causes a fractured section to appear to be dark gray.

GREASE FITTING: A device which permits injection of grease into a bearing surface.

GRIT SEAL: A resilient contact used to minimize valve bearing and shaft seal contact with flows containing suspended solids.

GROOVED END: Circumferential recess that is cast, cut, or otherwise formed onto a pipe, fitting, or valve end to form a restrained joint when used with the proper gasket and coupling.

H

HANDWHEEL: A wheel-shaped valve operating device intended to be grasped with one or both hands which allows turning the valve stem or operator shaft to which it is attached.

HARD FACING: A surface preparation in which an alloy is deposited on a metal surface usually by weld overlay to increase resistance to abrasion and or corrosion.

HAZEN-WILLIAMS FORMULA: An equation developed in 1902 by Gardner Williams and Allen Hazen to express flow relations in pressure conduits.

HEADLOSS: Energy losses due to the resistance of flow of fluids. May be classified into conduit surface and conduit form losses.

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HEAD: (1) The height of the free surface of fluid above any point in a hydraulic system; a measure of the pressure or force exerted by the fluid. (2) The energy, either kinetic or potential, possessed by each unit weight of a liquid, expressed as the vertical height through which a unit weight would have to fall to release the average energy possessed. It is used in various compound terms such as pressure head, velocity head, and loss of head.

HEADER: A large pipe installed to intercept the ends of a series of pipes; a manifold.

HEAT TREATMENT: Describes any process or procedure by which the internal structure of steel is altered by heating to produce desired physical and mechanical characteristics.

HIGH POINT: The location on a pipeline or piping system where the grade changes from upward to downward.

HIGH-PERFORMANCE BUTTERFLY VALVE: Common name for a double offset disc design, which the butterfly valve conforms to the ASME pressure/temperature rating, using materials of construction to accomplish the ratings.

HOLIDAY: A void in a coating such as a paint or a wrapping where the coating is not adhered to the substrate.

HORIZONTAL PUMP: - (1) reciprocating pump in which the piston or plunger moves in a horizontal direction. (2) A centrifugal pump in which the pump shaft is in a horizontal position.

HORIZONTAL SCREW PUMP: A pump with a horizontal cylindrical casing in which operates a runner with radial blades like those of a ship's propeller. The pump has a high efficiency at low heads and high discharges and is used extensively in drainage work.

HOT TAP: A connection made to a pipeline while the line is under pressure or in service. A special procedure is required to make an opening in the pipe without leaking any of the line contents.

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.

HRB or HRC: Rockwell B or C hardness - hardness measured on scales comparing the sizes of indentations made in the tested material. The larger the number, the harder the material.

HUB: An integrally cast raised area or "boss" on the valve body used to support the valves shaft(s) and bearings. Sometimes called a trunnion.

HYDRAULIC GRADE LINE: A hydraulic profile of the piezometric level of water at all points along a line. The term is usually applied to water moving in a conduit, open channel, or stream, but may also be applied to free or confined groundwater. In an open channel, it is the free water surface. See also hydraulic grade.

HYDRAULIC GRADE: In a closed conduit under pressure, artisan aquifer, or groundwater basin, a line joining the elevations to which water would rise in pipes freely vented and under atmospheric pressure. In an open channel, the hydraulic grade is the water surface.

HYDRAULIC GRADIENT: The slope of the hydraulic grade line; the rate of change of pressure head; the ratio of the loss in the sum of the pressure head and position head to the flow distance. For open channels, it is the slope of the water surface, and is frequently considered parallel to the invert. For closed conduits under pressure, it is the slope of the line joining the elevations to which water would rise in pipes freely vented and under atmospheric pressure. A positive slope is usually one which drops in the direction of flow.

HYDRAULIC HEAD: The height of the free surface of a body of water above a given point beneath the surface. See also head.

HYDRAULIC JUMP: (1) The sudden and usually turbulent passage of water in an open channel, under conditions of free flow, from low stage below critical depth to high stage above critical depth; during this passage the velocity changes from supercritical to subcritical. It represents the limiting condition of the surface curve, in which that curve tends to become perpendicular to the stream bed. (2) In a closed conduit, the sudden rise from part-full flow at a supercritical velocity to full flow under pressure; the depth plus the pressure head downstream from the hydraulic jump equals the high stage obtained for open-channel flow.

HYDRAULIC MOTOR ACTUATOR: A device by which rotation of a hydraulically powered motor is converted into mechanical motion.

HYDRAULIC PROFILE: (1) A profile along the axis of flow of a stream or conduit showing elevations of the bottom and of the energy line. (2) A profile along the axis of flow through a wastewater or

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water treatment plant, showing elevations of the free water surface.

HYDRAULIC SLOPE: The slope of the hydraulic grade line. See also hydraulic gradient.

HYDROFOIL DISC DESIGN: A check valve disc designed to come off its seat, quickly reach its full open position and become fully stabilized under minimal flow conditions.

HYDROPNEUMATIC SYSTEM: - A water system, usually small, in which a water pump is automatically controlled by the air pressure in a compressed-air tank.

HYDROSTATIC TEST: A static pressure test using water, in which the item or system to be tested is filled with water and pressurized to detect leaks and verify structural integrity.

I

IBBM: Iron body, bronze mounted-common term for valves with iron body and bonnet (pressure-retaining parts) and bronze trim (seats, stem, bushings).

ID: Inside diameter-the distance, either nominal or actual, from the inside wall of an annular surface to the opposite inside wall.

INCOMPRESSIBLE FLOW: A fluid such as water, which has no significant change in volume and density as the pressure increases.

INFLUENT: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant, or treatment process. See also effluent.

INLET PORT: That end of a valve which is connected to the upstream pressure zone of a fluid system.

IN-PLANT: That which is within the property lines of a water or wastewater treatment plant.

INSIDE THE FENCE: That which is within the property lines of a water or wastewater treatment plant.

INSTALLED FLOW CHARACTERISTIC: Flow characteristic when the pressure drop across the valve varies as dictated by flow and related conditions in the system in which the valve is installed.

INTERNAL PRESSURE RELIEF: A self-relieving feature in non-independent seating valves that automatically relieves excessive internal body pressure caused by sudden changes in line pressures. By means of the piston effect principal the excessive body pressure will move the seat away from its seating surface and relieve it to the lower pressure side.

INVERTED SIPHON: A pipeline crossing a depression or passing under a structure and having a reversal in grade on a portion of the line, thus creating a V- or U-shaped section of conduit. The line is under positive pressure from inlet to outlet and should not be confused with a siphon.

ISO: International Standards Organization-worldwide standards coordinating organization.

ISOLATION VALVE: A shut-off valve used to isolate part of a pipeline, a process or piece of equipment.

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.

J

JIS: Japan Industrial Standard-designation for standards published by the national standards organization of Japan.

K

KINETIC ENERGY: Energy available from a flowing column of water due to its velocity.

KINETIC HEAD: The theoretical vertical height through which a liquid body may be raised by virtue of its kinetic energy. It is equal to the square of the velocity divided by twice the acceleration due to gravity. See also velocity head.

KINETIC: Relating to the motion of material bodies and to the force and energy associated therein.

KNIFE GATE VALVE: Type of gate valve using a thin, flat gate usually used in controlling slurries.

L

LAMINAR FLOW: The flow of a viscous fluid in which particles of the fluid move in parallel layers each of which has a constant velocity but is in motion relative to its neighboring layers. Also called streamline flow, viscous flow.

LANTERN RING: A rigid spacer ring used in the Lantern Ring type of Packing Chamber to permit lubrication of the Packing, purging of the Shaft or Stem area, or a leak-off system.

LEVER: An operating device for quarter-turn valves.

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LIFT PUMP: A pump used to elevate wastewater flow in a sewer to facilitate gravity flow in a portion of a collection system, before treatment, or afterwards, before effluent discharge.

LIFT STATION: A structure that contains pumps and appurtenant piping, valves, and other mechanical and electrical equipment for pumping water, wastewater, or other liquid. Also called pump station.

LIFTING LUGS: Lugs that may be provided on large valves, for lifting and positioning. Also called lifting eyes.

LIMIT SWITCH: An electrical device providing a signal to a remote observation station indicating when the valve is in the fully open or fully closed position. Usually a component of a valve operator.

LINE VOLTAGE: Voltage existing between the two lines of an electric supply.

LINEAR ACTUATOR: Device which provides valve thrust in a linear motion.

LINEAR DISC TRAVEL: A valve disc which opens and closes in a straight line. The valve disc orientation is perpendicular to the valve seat providing flow area equal to disc stroke position.

LINEAR FLOW CHARACTERISTIC: Inherent flow characteristic which can be represented ideally by a straight line on a rectangular plot of flow coefficient versus percent rated travel. (Equal increments of travel yield equal increments of flow coefficient change at a constant pressure drop).

LIQUID PENETRANT INSPECTION: Also known as Dye Penetrant Inspection. A nondestructive method of detecting the presence of surface cracks and imperfections through use of a special red dye. Abbreviated as LPI or PT.

LIQUID: A substance that flows freely. Characterized by free movement of the constituent molecules among themselves, but without the tendency to separate from one another characteristic of gases. Liquid and fluid are often used synonymously, but fluid has the broader significance, including both liquids and gases. See also fluid.

LIVE LOADING: is the application of a spring load to the gland follower of a packed valve. A Belleville spring between the gland follower and its fastening studs and nuts provides an effective way to establish and maintain a controlled amount of stress in the packing set.

LOCKING DEVICE: Any valve attachment whose purpose is to prevent the operation of the valve by unauthorized persons.

LUBRICATED PLUG VALVE: Type of plug valve in which the plug rotation and sealing can be assisted by sealant applied under external pressure.

LUG TYPE VALVE: A valve with short face-to-face dimension in proportion to the fluid passage diameter designed to be bolted to one or both flanges in a line by the use of fasteners, which are threaded into lug protrusions of the valve body.

M

MAGNETIC PARTICLE INSPECTION: A nondestructive method of detecting the presence of surface cracks and imperfections through use of fine iron particles in an electrical field. Abbreviated as MPI or MT.

MAIN SEWER: (1) In larger systems, the principal sewer to which branch sewers and submains are tributary; also called trunk sewer. In small systems, a sewer to which one or more branch sewers are tributary. (2) In plumbing, the public sewer to which the house or building sewer is connected.

MANHOLE: (1) A structure atop an opening in a gravity sewer to permit entry for servicing. Usually placed at all points of change in sewer grade and at least every 300 to 400 feet along the line. (2) An opening in the top or side of an enclosed vessel to permit human entry.

MANIFOLD: A pipe fitting with numerous branches to convey fluids between a large pipe and several smaller pipes or to permit choice of diverting flow from one of several sources or to one of several discharge points. See also header.

MANNING FORMULA: A formula for open-channel flow, published by Manning in 1890, which gives the value of C in the Chezy Formula.

MANNING ROUGHNESS COEFFICIENT: The roughness coefficient in the Manning Formula for determination of the discharge coefficient in the Chezy Formula.

MANOMETER: An instrument for measuring pressure. It usually consists of a U-shaped tube containing a liquid, the surface of which in one end of the tube moves proportionally with changes in pressure in the liquid in the other end.

MANUAL OVERRIDE: A mechanical device provided on actuators that allows the manual positioning of the actuator.

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MATERIAL TEST REPORTS: Certificates provided by the steel manufacturer or foundry indicating the chemical analysis and mechanical properties of a specific batch of steel or castings traced by sequentially assigned heat numbers or codes.

MAWP: (Maximum Allowable Working Pressure or Cold Working Pressure). The maximum working pressure (Bar or Psi) at which a valve is designed to be operated up to.

MDS – MATERIAL DATA SHEET: The material data sheet defines 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.

MEAN VELOCITY: The average velocity of a stream flowing in a channel or conduit at a given cross section or in a given reach. It is equal to the discharge divided by the cross-sectional area of the section, or the average cross-sectional area of the reach. Also called average velocity.

MECHANICAL JOINT: A bolted pipe joint utilizing a compressed gasket and gland.

MECHANICAL SEAL: 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: A seating design characterized by the lack of any soft deformable seating material. Metal-to-metal seats can withstand much higher pressures and temperatures than soft seats, but leakage rates are usually greater except in special valve designs.

MIXED-FLOW PUMP: A centrifugal pump in which the head is developed partly by centrifugal force and partly by the lift of the vanes on the liquid. This type of pump has a single inlet impeller; the flow enters axially and leaves axially and radially.

MODULATE: Function of a controller which causes a valve to continuously respond to position signal and position the valve between the closed and full open positions.

MOTOR-OPERATED VALVE: Any valve which is opened or closed by a motorized actuator.

MSS: Manufacturers Standardization Society of the Valve and Fitting Industry-trade organization responsible for issuing voluntary standards for valves and piping material.

MUD VALVE: A plug valve for draining out sediment, inserted in the bottom of settling tanks.

N

NACE – NATIONAL ASSOCIATION OF CORROSION ENGINEERS: This technical association publishes papers, articles and standards on all aspects of corrosion, and has written the definitive standards for valve materials for sour gas service.

NDE: (NON-DESTRUCTIVE EXAMINATION): See NDT.

NDT: (NON-DESTRUCTIVE TESTING): Inspection tests which are not destructive to the component structure or function. Tests such as radiography, dye penetrant and magnetic particle testing.

NEEDLE VALVE: A multi-turn device with a needle-shaped closing element through which the flow is controlled by means of a tapered needle which extends through the outlet, reducing the area of the outlet as it advances and enlarging the area as it retreats.

NEGATIVE PRESSURE: A pressure less than the local atmospheric pressure at a given point.

NEMA CLASSIFICATION: Code established for the construction of electrical components by the National Electrical Manufacturers Association.

NET POSITIVE SUCTION HEAD: The amount of energy in the liquid at the inlet of the pump expressed in feet of water, absolute.

NFPA – NATIONAL FIRE PROTECTION ASSOCIATION: Organization responsible for maintaining standards that are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

NICKEL PLATED: Coated with nickel by electroplating or other means

NON-POTABLE WATER SYSTEM: Water not safe for drinking, personal or culinary use.

NON-RISING STEM INSIDE-SCREW: Type of gate valve design in which the disc rises on the threaded part of the stem, instead of the stem rising through the bonnet (the stem does not rise or descend as the stem turns).

NON-RISING STEM: When the stem turns in a gate Valve, the gate moves but the stem does not rise. Stem threads are generally exposed to process fluids.

NON-SLAMMING VALVE: A check valve designed to close prior to reverse flow taking place or, close very slowly in the presence of reverse flow allowing the flow energy to dissipate.

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NORMALLY CLOSED: A state in which a valve or other component stays closed in the absence of a signal or manual intervention. Any such outside action will open the valve.

NORMALLY OPEN: A state in which a valve or other component stays open in the absence of a signal or manual intervention. Any such outside action will close the valve.

NPS: Nominal pipe size--dimensionless number used as designator for sizes of pressure pipe.

NPT - NATIONAL PIPE THREAD: standard tapered thread for pressure pipe and components. Requirements defined in ASME B1.20.1.

NSF INTERNATIONAL: Industry sponsored testing laboratory and standards organization.

O

OD: The measurement of the outside diameter of a circular part.

ON-OFF VALVE: any number of valve types used for either full open or shutoff service.

OPEN LEFT: Indicates CW rotation to close valve.

OPEN RIGHT: Indicates CCW rotation to close valve.

OPERATING CYCLE: Actuation of a valve from one limit of its operation position to the opposite limit and return to its original position. Example: full-closed to full-open to full-closed.

OPERATING NUT: The square, tapered nut that fits on top of a valve shaft and allows it to be turned by a tee-handle from above. Usually installed on buried valves.

OPERATING PRESSURE: The pressure that a component normally sees during the course of day-to-day operation. This pressure, plus any other factors such as upsets that may occur, is used to determine the design pressure.

OPERATING TEMPERATURE: The temperature that a component normally sees during day-to-day operation. This temperature, plus any other factors such as excursions that may occur, is used to determine the design temperature.

ORIFICE BUTTON: The resilient closure element in an Air Release Valve. Sometimes referred to as needle.

O-RING: An elastomeric or synthetic seal ring of circular cross section.

OS&Y - OUTSIDE SCREW & YOKE: A valve design in which the stem threads are above the packing gland or

outside the valve body and there is a yoke to support the top or outer end of the stem.

OSCILLATION: A periodic movement to and fro, or up and down.

OUTFALL SEWER: A sewer that receives wastewater from a collecting system or from a treatment plant and carries it to a point of final discharge. See also outfall.

OUTFALL: (1) The point, location, or structure where wastewater or drainage discharges from a sewer, drain, or other conduit. (2) The conduit leading to the ultimate disposal area. Also see outfall sewer, wastewater outfall.

OUTLET PORT: the end of the valve which is connected to the downstream pressure zone of a fluid system.

OUTSIDE THE FENCE: Water or wastewater lines and appurtenances located outside the boundaries of a water or wastewater treatment plant.

OZONATION: The process of contacting water, wastewater, or air with ozone for purposes of disinfection, oxidation, or odor control.

OZONIZER: A device for producing ozone from pure oxygen or air. It consists essentially of two electrodes between which a current of the dry gas is passed. High voltage electric discharges pass through the air between the electrodes and cause the formation of ozone.

P

PACKING GLAND: A device installed on a packing chamber to retain the packing and to maintain pressure on it.

PACKING: Any soft substance used to seal the area of a shaft where it protrudes from inside a pressure boundary, such as a valve or pump.

PARSHALL FLUME: A calibrated device developed by Parshall for measuring the flow of liquid in an open conduit. It consists essentially of a contracting length, a throat, and an expanding length.

PARTIAL VACUUM: The description of a space condition in which the pressure is less than atmospheric.

PATTERN: A duplicate made of wood or metal of a part to be cast. Used to form the mold into which the molten metal is poured.

PEEK: Polyether Ether Ketone is a crystalline thermoplastic with excellent mechanical and

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chemical resistance properties that are retained to high temperatures.

PENSTOCK: The pipeline or conduit which carries water under pressure from the forebay or last free water surface to the turbines in a power generating facility.

pH: A measure of the hydrogen-ion concentration in a solution, expressed as the logarithm (base ten) of the reciprocal of the hydrogen-ion concentration in gram moles per liter. On the pH scale (0-14), a value of 7 at 25°C represents a neutral condition. Decreasing values, below 7, indicate increasing hydrogen-ion concentration (acidity); increasing values, above 7, indicate decreasing hydrogen-ion concentration (alkalinity).

PIEZOMETER: An instrument for measuring pressure head in a conduit, tank, or soil. It usually consists of a small pipe or tube tapped into the side of the container, with its inside end flush with, and normal to, the water face of the container, and connected with a manometer pressure gage, mercury or water column, or other device for indicating pressure head.

PIG: Also known as a scraper-the solid object placed in a pipe line, to be pushed along by line pressure, for the purpose of separating one fluid from a different one being shipped through the same line or to clean (scrape) the walls of the pipe.

PIG IRON: An intermediate product of the iron industry obtained from melting. Is intended for re-melting.

PILOT VALVE: Device acting between the source of air pressure and the actuator that directs air flow to the required actuator air inlet ports.

PINCH VALVE: A valve having a flexible center tube or hose which is "pinched" to effect closure.

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 drive the internal reduction gearing.

PIPE COLLAPSING PRESSURE: The internal negative pressure at which a pipe will collapse in on itself.

PIPE GRADE: The slope or fall of the pipe in the direction of flow.

PIPELINE PROFILE: A cross-sectioned view of a pipeline showing elevation and length.

PIPELINE: A line of pipe including fittings, valves and control devices for conveying liquids, gases or finely divided solids.

PISTON PUMP: A reciprocating pump in which the cylinder is tightly fitted with a reciprocating piston.

PITOMETER: A device operating on the principle of the Pitot tube, principally used for determining the velocity of flowing fluids at various points in a water distribution system, and to ascertain waste, leakage, or clogging of pipes.

PLASTICS: A broad classification covering a variety of non-metallic, synthetic or organic materials capable of being molded or formed into desired shapes.

PLUG VALVE: A type of valve in which a cylindrical or tapered cylindrical (truncated cone) section turns one-quarter turn to close and open the flow passageway.

PLUG: (1) A fitting for the bell end of cast iron pipes to close the opening. (2) A fitting that has an exterior pipe thread and a projecting head by which it is screwed into the opening of a fitting. (3) The movable part of a tap, cock, faucet, plug, valve.

PMI - POSITIVE MATERIAL IDENTIFICATION: A method for verifying the identity of a material, often using a portable spectrometer, usually with x-rays or a optical spectrometer.

PN: Nominal pressure-standard abbreviation for pressure rating used in ISO standards.

PNEUMATIC ACTUATOR: Device that converts pneumatic pressure into mechanical motion and force to move a valve's closure member.

PNEUMATIC EJECTOR: A device for raising wastewater, sludge, or other liquid by alternately admitting it through an inward swinging check valve into the bottom of an airtight pot and then discharging it through an outward swinging check valve by admitting compressed air to the pot above the liquid.

PNEUMATIC PUMPING: Pumping by means of an air-lift pump.

POPPET VALVE: A valve consisting of a flat disk which raises and lowers without rotation about the valve opening and which is kept in position and on its path of travel by a rod or shaft attached to the disk at right angles to it and extending through the valve opening into a groove or hole which guides its movement. Also called a mushroom valve.

POROSITY: A defect found in castings or welds consisting of gas bubbles or voids in the solidified metal.

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PORT: An opening in a valve body or closure element, usually used in control valve terminology.

POSITION INDICATOR: Any external device which visually indicates the open and closed position of valve.

POSITIONER: A device used to position a valve with regard to a signal. The positioner compares the input signal with a mechanical feedback link from the actuator.

POSITIVE HEAD: The energy possessed per unit weight of a fluid, due to its elevation above some datum. Also called elevation head.

POSITIVE ROTARY PUMP: A type of displacement pump consisting essentially of elements rotating in a pump case which they closely fit. See also rotary pump.

POTABLE WATER: Water that does not contain objectional pollution, contamination, minerals, or infective agents and is considered satisfactory for domestic consumption.

PPM: Parts per million, a unit of concentration on a weight or volume basis.

PRESSURE: The force exerted by a fluid on the surfaces containing it.

PRESSURE CLASS: A designation of pressure capability. E.g. ANSI 150, 300, PN10, PN16, etc.

PRESSURE GAUGE: Instrument for measuring the pressure of fluids, gases or air.

PRESSURE HEAD: The head represented by the expression of pressure over weight. The head is usually expressed as height of liquid in a column corresponding to the weight of the liquid per unit area; for example, feet head of water corresponding to pounds per square inch.

PRESSURE MAIN: Pressurized sewer lines that deliver wastewater from a pumping station to a treatment plant, a receiving stream, or a higher point in the system. Also called force main.

PRESSURE SEALED BONNET: A type of bonnet design where the fluid pressure is used to produce the seal between the body and bonnet.

PRESSURE TANK: A tank used in connection with a water distribution system, for a single household, for several houses, or for a portion of a larger water system, which is airtight and holds both air and water, and in which the air is compressed, and the pressure so created is transmitted to the water.

PRESSURE-REDUCING VALVE: A valve with a horizontal disk for reducing pressures automatically, according to the setting of the pressure-regulating valves.

PRESSURE-REGULATING VALVE: A valve placed at either end of a pressure-regulating apparatus inserted in a water main to regulate the pressure in a water line either upstream or downstream from the valve.

PRESSURE-RELIEF VALVE: A valve that opens automatically to ample area when the pressure reaches an assigned limit, to relieve the stress on a pipeline.

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.

PRESTRESSED CONCRETE PIPE: A reinforced concrete pipe placed in compression by a highly stressed, closely spaced helical wire winding. The reinforcement permits a concrete pipe to withstand tension forces at the same time it is under compression from surrounding wires.

PRIMING: (1) The first filling with water of a canal, reservoir, or other structure built to containing water. (2) The action of starting the flow in a pump or siphon.

PSIA: Pounds per square inch, absolute-pressure force expressed without reference to ambient pressures.

PSIG: Pounds per square inch, gage-pressure force expressed with reference to standard atmospheric pressure. Standard atmospheric pressure is defined as 14.7 psi.

PSI: Pounds per square inch-measure of force, either pressure force or tensile or compressive stress in a material.

PUMP CAPACITY: The ability of a pump to pump against a given head, usually stated in flow and/or pressure.

PUMP EFFICIENCY: The ratio of energy converted into useful work to the energy applied to the pump shaft, or the energy difference in the water at the discharge and suction nozzles divided by power input at the pump shaft.

PUMP PIT: A dry well or chamber, below ground level, in which a pump is located.

PUMP PRIMER: - A vacuum pump attached to the suction end of a pump for priming the pump automatically.

PUMP STATION: A structure containing pumps and appurtenant piping, valves and other mechanical and

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electrical equipment for pumping water, wastewater, or other liquids. Also called lift station.

PUMP STRAINER: A device placed on the inlet of a pump to strain out suspended matter that might clog the pump.

PUMP SUBMERGENCE: Vertical distance of pump inlet or suction below water level in pump pit or after bay.

PUMP VALVES: The opening through which water enters and leaves the cylinders of a displacement pump.

PUMPING HEAD: The sum of the static head and friction head on a pump discharging a given quantity of water.

PUMPING LEVEL: The elevation at which water stands in a well when the well is being pumped at a given rate.

PUMPING LINE: The discharge pipe from a pump.

PURGING AIR: The removal of air from a pipeline through an Air/Vacuum valve or Combination Air Valve.

PUSH-ON JOINT: Joining design for valves and pipe that utilizes a rubber gasket that fits in the annular recess between the bell end of a pipe or valve and the spigot end of the adjoining pipe.

Q

QUALITY ASSURANCE: Planned regular and/or preventive actions which are used to ensure that materials, products, or services will meet specified requirements.

QUARTER TURN VALVE: Shut-off valve that pivots one-quarter turn about its vertical centerline to open and close.

R

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

RAISED FACE (RF): A flange sealing surface in which the gasket seating area is a portion of the diameter covering the region from the inside diameter to some radius lying just inside the bolt holes, with that portion raised slightly above the remainder of the flange surface. This increases the effective load on the gasket and increases the sealing effectiveness.

RECIPROCATING PUMP: A type of displacement pump consisting essentially of a closed cylinder containing a piston or plunger, as the displacing mechanism, drawing liquid into the cylinder through an inlet valve and forcing it out through an outlet valve. When the piston acts on the liquid in one end of the cylinder, the pump is termed single-action, and when it acts in both ends, it is termed double-action.

RECLAIMED WATER: Treated wastewater now suitable for a direct beneficial or controlled use. Although, not safe for human consumption.

REDUCED PORT: A valve port opening that is smaller than the line size or the valve end connection sizes.

REDUCER: A pipe fitting designed to be the transition from one pipe size to another size. The term increaser is used only for fittings with end connections that are one-way, such as male and female or bell and spigot, and the fitting is designed to be installed in the direction that the line size increases.

REDUCING VALVE: A spring- or lever-loaded valve similar to a safety valve, by which a lower and constant pressure may be maintained beyond the valve.

REFLUX VALVE: A nonreturn valve used in a pipeline at a rising gradient to prevent water that is ascending the gradient from flowing back in the event of a burst lower down.

RELEASING AIR: The removal of air from a pipeline. See Air Valve.

RELIEF VALVE: A self-actuating valve designed to open when the pressure under the seat reaches a preset value, by means of a spring or a poppet or any one of several other devices.

RESILIENT SEAT: A valve seat containing a soft seal such as an O-ring or plastic to assure tight shut-off.

REVERSE FLOW: A flow in which the fluid is traveling in the opposite direction of the systems normal operating condition.

REVERSE PRESSURE: Pressure applied by the flow against the face of the valve's closure member and/or the seat end of the valve.

RISER PIPE: (1) In plumbing, a water supply pipe in a building, that extends vertically one full story or more to convey water to branches or fixtures. (2) The vertical supply pipe to an elevated tank.

RJ or RTJ: Ring joint or ring-type joint-a flange sealing surface in which the gasket seating area is two narrow lines of metal-to-metal contact along

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a metal ring, softer than the flange, that is set into a groove in each flange face.

ROTARY PUMP: A type of displacement pump consisting essentially of elements rotating in a pump case which they closely fit. The rotation of these elements alternately draws in and discharges the water being pumped. Such pumps act with neither suction nor discharge valves, operate at almost any speed, and do not depend on centrifugal forces to lift the water.

ROUGHNESS: A measure of the resistance to fluid flow of a channel, pipe, or other conduit, as a result of its fabrication, scale formation, biological growth, or other causes.

ROUGHNESS COEFFICIENT: A factor, in the Chezy, Darcy-Weisbach, Hazen-Williams, Kutter, Manning, and other formulas for computing the average velocity of flow of water in a conduit or channel, which represents the effect of roughness of the confining material on the energy losses in the flowing water.

RTFE (REINFORCED POLYTETRAFLUOROETHYLENE): Reinforced PTFE (typically fiber glass 20-25%) and used for valve seats. It is suitable for valves with higher pressures but may still be limited in Class 900 and 1500 valves which might not be able to have full flange rating.

S

SADDLE: (1) A steel or concrete structure used for supporting a pipe or penstock laid above the surface of the ground. (2) A depression in a ridge. (3) An assembly of circumferential metal straps on a pipe where a connection is to be installed.

SAFE DRINKING WATER ACT (SDWA): Act of 1974 the Federal Government established, through the Environmental Protection Agency (EPA), national standards of safe drinking water.

SAFETY FACTOR: The ratio between an ultimate property (typically strength) and that required under design conditions.

SAFETY VALVE: A valve design to relieve overpressure. Mechanically the same as a relief valve, but the reasons for locating one versus the other are not always the same.

SCRAPER: (1) A device for insertion in pipelines that is pushed or hauled through by some method or device such as water pressure, rope, cable, to remove accumulated organic or mineral deposits. Scrapers

are used principally in pipe too small for access by man and are of various designs and sizes. (2) A device used in the bottom of a sedimentation tank to move settled sludge to a discharge port. (3) A blade used to separate accumulated sediment from filter or screen surfaces. See also squeegee.

SCREW-FEED PUMP: A pump with either horizontal or vertical cylindrical casing, in which operates a runner with radial blades like those of a ship's propeller. See also horizontal screw pump, vertical screw pump.

SEAT: The fixed component, mounted in the valve body, that the closure element contacts in order to close off flow.

SECTIONALIZING VALVE: A large valve installed in a pipeline to shut off flow in a section for the purpose of inspection or repair. Such valves are usually installed in the main lines.

SEWAGE AIR VALVE: Air Valve used in sewage applications.

SHAFT: The valve component through which outside motion is applied to the closure member.

SHAFT-MOUNTED BALL VALVE: The configuration in which the body bearings support the shaft and ball as a complete assembly and the shaft sees both torsional operating loads and differential pressure loads.

SHUTOFF PRESSURE: The actual differential pressure against which the valve's closure member is closed.

SHUTOFF VALVE: A valve whose primary purpose is to act as a main block valve, usually as an emergency shutdown but not necessarily integrated into the control system as a true emergency shutdown valve would be.

SIPHON: A closed conduit a portion of which lies above the hydraulic grade line, resulting in a pressure less than atmospheric and requiring a vacuum within the conduit to start flow. A siphon utilizes atmospheric pressure to effect or increase the flow of water through the conduit.

SLOPE: A measure of pipe rise expressed as rise divided by run.

SLUDGE: (1) The accumulated solids separated from liquids, such as water or wastewater, during processing. (2) Organic deposits on bottoms of streams or other bodies of water. (3) The removed material resulting from chemical treatment, coagulation, flocculation, sedimentation, flotation, and/or biological oxidation of water or

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wastewater. (4) Any solid material containing large amounts of entrained water collected during water or wastewater treatment. See also activated sludge, settleable solids.

SLUICE GATE: A gate, used for sluicing, constructed to slide vertically and fastened into or against the masonry of dams, tanks, or other structures.

SLUICE: (1) A conduit for carrying water at high velocity. (2) An opening in a structure for passing debris. (3) To cause water to flow at high velocities for wastage, for purposes of excavation, ejecting debris, and other purposes.

SLURRY: A thin watery mud, or any substance resembling it, such as a lime slurry.

SOLENOID VALVE: A valve which is open or closed by the action of an electrically excited coil wire magnet upon a bar of steel attached to the valve disc (or seat).

SPLINE: A set of grooves somewhat similar to gear teeth, for the purpose of interlocking male and female members such as a shaft and an internal splined coupling.

SPUR GEAR: The simplest of gears - in a gear set, the pinion and ring gear are aligned on parallel shafts. Can be added to another gear operator to further increase the mechanical advantage afforded by the gear.

STANDARD PORT: Also known as regulator port valve or standard bore valve. Type of valve equipped with a reduced flow-passageway at the closure member for a given end connection size. In a ball valve, this valve is usually considered to be one pipe size smaller flow port than a full port opening. A standard port is characterized by a typical bore size (as opposed to full bore) and its flow coefficient. Also considered a reduced ported valve.

STANDPIPE: (1) A pipe or tank connected to a closed conduit and extending to or above the hydraulic grade line of the conduit. It is often installed to afford relief from surges of pressure in pipelines. (2) A tank resting on the ground having height greater than diameter and used for storage of water in distribution systems. (3) In a building or structure, a fixed vertical pipe equipped with valved hose outlets, usually at each floor, to provide water for hose lines for firefighting.

STATIC HEAD: (1) The total head without reduction for velocity head or losses; for example, the difference in elevation of headwater and tail water of a power plant. (2) The vertical distance between the free level of the source of supply and the point of free discharge or the level of the free surface.

STATIC SUCTION HEAD: The vertical distance from the source of supply when its level is above the pump to the center line of the pump.

STATIC SUCTION LIFT: The vertical distance between the center of the suction end of a pump and the free surface of the liquid being pumped. Static lift does not include friction losses in the suction pipes. Static suction head includes lift and friction losses.

STEM: See shaft.

STOP VALVE: A large valve installed in a pipeline to shut off flow in a section to permit inspection or repair. Such valves are usually installed in the main lines. Also called sectionalizing valve.

STORM SEWER: A sewer that carries storm water and surface water, street wash and other wash waters, or drainage, but excludes domestic wastewater and industrial wastes. Also called storm drain.

STORM WATER: Surface water from rain, snow, or ice melting and running *off* from the surface of a drainage area. It is normally collected in sewers separate from the sanitary sewers, and receives minimal, if any, treatment prior to discharge to a receiving water. When collected in a combined sewer system, the resulting mixture of sewage and stormwater is called combined wastewater.

STROKE: The distance the valve plug, valve stem, or cylinder piston moves to go from a fully closed to a fully open position or from fully open to fully closed. A stroke comprises one half of a cycle. Also called Travel.

STUFFING BOX: Also known as packing box, the volume surrounding a shaft at the area on the shaft where it emerges from a pressurized or isolatable space, used to contain the packing.

SUBMAIN SEWER: A sewer into which the wastewater from two or more lateral sewers is discharged and which subsequently discharges into a main, a trunk, or other collector.

SUCTION HEAD: The head at the inlet to a pump.

SUCTION LIFT: The vertical distance from the liquid surface in an open-top tank or reservoir to the centerline of a pump drawing from the tank or reservoir and set higher than the liquid surface.

SUCTION PUMP: A pump set above the surface of the body of water which supplies the pump, necessitating the *lifting* of the water from such surface to the pump cylinder or casing.

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SURGETANK: A tank or chamber located at or near a hydroelectric powerhouse or pump station, which absorbs water and cushions the increased pressure on the penstock which is caused by the rapid deceleration of the water flow.

SURGE: A sudden rise or drop in line pressure due to a change in fluid velocity.

SWING CHECK: A check valve in which the closure element is suspended from the top and swings out of the flow way.

T

TENSILE STRENGTH: The maximum stress a material subjected to a stretching load can withstand without fracturing.

TEST COCK: An appurtenance on an assembly or valve which is used when testing the assembly.

THREE WAY VALVE: Type of valve with three ports arranged to control the direction of flow through the valve.

THROTTLING DEVICE: A device mounted on the discharge of an Air/Vacuum Valve to control the rate of discharge of air upon system pressurization.

THROTTLING: The act of reducing the pressure or flow rate of a fluid passing through a partially closed valve.

THRUST BEARING: A flat, washer shaped device used to support axial loads on the valve shaft.

THRUST: A linear force applied to the shaft of a valve, usually expressed in units of pounds (kilograms).

TILTED DISC®CHECK VALVE: A check valve with an eccentrically mounted disc allowing flow above and below the disc. It can be supplied with top or bottom mounted dash pots to further reduce any slamming potential, especially in high head applications.

TORQUE: The rotational force imposed on or through a shaft.

TOTAL DYNAMIC HEAD: The difference between the elevation corresponding to the pressure at the discharge flange of a pump and the elevation corresponding to the vacuum or pressure at the suction flange of the pump, corrected to the same datum plane, plus the velocity head at the suction flange of the pump.

TRANSFER PUMP: A pump specifically designed to convey water, wastewater, or chemical solutions from one tank to another.

TRANSIENT: A pulse, damped oscillation, or other temporary phenomenon occurring in a system prior to reaching a steady-state condition. See surge.

TRANSIENT ANALYSIS: The study of transients in a pipeline.

TRUNK MAIN: A large pipe serving as a supply main or feeder main in a water distribution system.

TRUNK SEWER: A sewer that receives many tributary branches and serves a large territory.

TRUNNION: The part of a ball valve which holds the ball on a fixed vertical axis and about which the ball turns.

TRUNNION-MOUNTED BALL VALVE: The configuration in which the body bearings directly support the ball and differential pressure loads while the shaft supports torsional operating loads but not differential pressure loads.

TUBERCULATION: The formation of tubercles or mineral deposits in pipe, with an increase in frictional coefficient.

TURBIDITY: (1) A condition in water or wastewater caused by the presence of suspended matter, resulting in the scattering and absorption of light. (2) Any suspended solids imparting a visible haze or cloudiness to water which can be removed by filtration. (3) An analytical quantity usually reported in turbidity units determined by measurements of light scattering.

TURBINE PUMP: A centrifugal pump in which fixed guide vanes partially convert the velocity energy of the water into pressure head as the water leaves the impeller.

TURBULENCE: (1) The fluid property that is characterized by irregular variation in the speed and direction of movement of individual particles or elements of the flow. (2) A state of flow of water in which the water is agitated by cross currents and eddies, as opposed to laminar, streamline, or viscous flow. See also turbulent flow.

TURBULENT VELOCITY: The velocity of water flowing in a conduit above which the flow will always be turbulent, and below which the flow may be either turbulent or laminar, depending upon circumstances.

U

UL: Underwriters Laboratories-organization that test materials intended for use in fire and safety applications.

Glossary of Valve Terms and Acronyms

V

VACUUM BREAKER: A device for relieving a vacuum or partial vacuum formed in a pipeline, thereby preventing back siphonage.

VACUUM RELIEF VALVE: A valve which admits air to the system if and when the system is attempting to reduce its pressure to less than atmospheric.

VALVE BOX: A metallic or concrete box or vault set over a valve stem and rising to the ground surface, to allow access to the stem in opening and closing the valve. A cover is usually provided at the surface to keep out dirt and debris.

VALVE KEY: A metal wrench with a socket to fit a valve nut and with a long handle for operating a gate valve from a distance of several feet.

VALVE STEM: The rod by means of which a valve is opened or closed; the rod lifts and pushes down the gate.

VALVE: A device which isolates or controls fluid direction, or flow rate.

VELOCITY HEAD: The energy of a liquid as a result of its motion. It is the equivalent head in feet through which the water would fall to acquire the same velocity.

VELOCITY: The time rate of change of position of a body; it is a vector quantity having direction as well as magnitude. Also known as linear velocity.

VENT PIPE: A pipeline, usually vertical, to allow venting of air or other gases from another pipe or a chamber, or to prevent negative pressures due to siphoning of a pipeline.

VENTING CAPACITY: The maximum capacity an air valve can vent air. Usually stated in CFM.

VENTURI FLUME: An open flume with a contracted throat which causes a drop in the hydraulic grade line. It is used for measuring flow. See also Parshall flume.

VENTURI METER: A differential meter for measuring flow of water or other fluid through closed conduits or pipes, consisting of a Venturi tube and one of several proprietary forms of flow-registering devices. The difference in velocity heads between the entrance and the contracted throat is an indication of the rate of flow. See also Venturi tube.

VENTURI TUBE: A closed conduit or pipe, used to measure the rate of flow of fluids, containing a gradual contraction to a throat, which causes a pressure head reduction by which the velocity may

be determined. The contraction is usually, but not necessarily, followed by an enlargement to the original size.

VENTURI VALVE: A reduced bore valve. A valve having a bore smaller in diameter than the inlet or outlet. The flow through a venturi valve will be reduced because of the smaller port.

VERTICAL PUMP: A centrifugal pump in which the pump shaft is in a vertical position.

VERTICAL SCREW PUMP: A pump, similar in shape, characteristics, and use to a horizontal screw pump, but which has the axis of its runner in a vertical position.

VISCOUS FLOW: A type of fluid flow in which there is a continuous steady motion of the particles, the motion at a fixed point always remaining constant. Also called a streamline flow. See also laminar flow.

VOLUTE PUMP: A centrifugal pump with a casing made in the form of a spiral or volute as an aid to the partial conversion of the velocity energy into pressure head as the water leaves the impellers.

W

WAFER: A flangeless valve designed for installation between mating pipe flanges.

WASTEWATER: The spent or used water of a community or industry which contains dissolved and suspended matter.

WASTEWATER COLLECTION SYSTEM: The sewer and pumping system used for the collection and conveyance of domestic, commercial, and industrial wastewater.

WATER: A transparent, odorless, tasteless liquid, a compound of hydrogen and oxygen, H₂O, freezing at 32°F or 0°C and boiling at 212°F or 100°C which, in more or less impure state, constitutes rain, oceans, lakes, rivers, and other such bodies.

WATER COLUMN: (1) The water above the valve in a set of pumps. (2) A measure of head or pressure in a closed pipe or conduit.

WATER HAMMER: The phenomenon of oscillations in the pressure of water about its normal pressure in a closed conduit, flowing full, which results from a too-rapid acceleration or retardation of flow. Momentary pressures greatly in excess of the normal static pressure may be produced in a closed conduit by this phenomenon.

Glossary of Valve Terms and Acronyms

WATER MAIN: The water pipe, located beneath a street, from which domestic water supply is delivered to the service pipe leading to specific premises.

WATER TOWER: A tower containing a tank in which water is stored, normally for providing local storage in a distribution system where ground-level storage would provide inadequate pressure. Also see standpipe.

WEDGE GATE: A type of gate valve in which the gate or disc is wedge shaped, thinner at the bottom, to wedge itself tightly between the two seats when closed.

WELL SERVICE AIR VALVE: A modified Air/Vacuum Valve designed to withstand the critical pressure thrust during pump startup.

WET WELL: A compartment in which a liquid is collected, and to which the suction pipe of a pump is connected.

WOG: Water-oil-gas---one of the early rating designations, still in use today for small valves, chiefly in low ratings. Also called nonshock rating. Normally this rating is meant to be the maximum working pressure at ambient temperature (32 to 100°F).

WP: Working pressure-synonym for operating pressure.

WORKING PRESSURE HEAD: The actual head of water flowing at any point in a conduit; the vertical height from the center line of a conduit to the hydraulic grade line.

WORM GEARS: A gear set in which the input shaft is offset from and perpendicular to the output shaft, and driving gear is very small and perpendicular to the driven gear. Worm gear operators are used on ball valves.

Y

YOKE: That part of a valve assembly used to position the Stem Nut or to mount the valve actuator.

Glossary of Valve Terms and Acronyms

ACRONYMS

A-C: Asbestos-Cement	MIL: 1/1000th of an inch
ANSI: American National Standards Institute	MJ: Mechanical Joint
API: American Petroleum Institute	MOV: Motor Operated Valve
ARV: Air Release Valve	MRO: Maintenance and Repair Order
ASME: American Society of Mechanical Engineers	MSS: Manufacturers Standardization Society
ASTM: American Society for Testing and Materials	NACE: National Association of Corrosion Engineers
AV: Air Valve	NDE: Non-Destructive Examination
AVV: Air/Vacuum Valve	NEMA: National Electrical Manufacturers Association
AWWA: American Water Works Association	NFPA: National Fire Prevention Association
AWWARF: American Water Works Association Research Foundation	NPDES: National Pollutant Discharge Elimination System
BAT: Best Available Technology	NPS: Nominal Pipe Size
BFA: Back Flow Actuator	NPT: National Pipe Thread Taper
BHN: Brinell Hardness Number	NST: National Straight Thread
BSI: British Standards Institution	OD: Outside Diameter
CAV: Combination Air Valve	OS&Y: Outside Screw and Yoke
CCW: Counterclockwise	PN: Nominal Pressure
CFM: Cubic Feet per Minute	POT: Point of Treatment
CFS: Cubic Feet per Second	PSI: Pounds per Square Inch
CI: Cast Iron	PSIA: Pounds per Square Inch, Absolute
CS: Carbon Steel or Cast Steel	PSIG: Pounds per Square Inch, Gage
CSA: Canadian Standards Association	PVC: Polyvinyl Chloride
CSO: Combined Sewer Overflow	RF: Raised Face
CW: Clockwise	RJ or RTJ: Ring Joint or Ring-Type Joint
CWA: Clean Water Act	RMS: Root Mean Square Roughness Height
CWP: Cold Working Pressure	RPM: Revolutions Per Minute
DI: Ductile Iron	SCADA: Supervisory Control and Data Acquisition
DIN: Deutsche Industrie Norme	SCV: Silent Check Valve
DN: Nominal Diameter	SCFM: Standard Cubic Feet per Minute
FBE: Fusion Bonded Epoxy	SDO: Standard Development Organization
FF: Flat Face	SDWA: Safe Drinking Water
FLG: Flange	SPDT: Single Pole Double Throw
FM: Factory Mutual Association	SS: Stainless Steel
FPS: Feet Per Second	SSPC: Steel Structures Painting Council
GPM: Gallons Per Minute	SSU: Seconds Saybolt Universal
HRB: Rockwell B Hardness	STP: Sewage Treatment Plant
HRC: Rockwell C Hardness	SWP: Steam Working Pressure
HW: Handwheel	TDCV: Tilted Disc® Check Valve
IBBM: Iron Body, Bronze Mounted	TIR: Total Indicator Reading
ID: Inside Diameter	UL: Underwriters Laboratories
IPS: Iron Pipe Size	UV: Ultraviolet
ISO: International Standards Organization	WEF: Water Environment Federation (formerly WPCF)
JIS: Japan Industrial Standard	WOG: Water-Oil-Gas
MCL: Maximum Contaminant Levels	WP: Working Pressure - Synonym for operating pressure
MFD: Mechanical Flow Diagram	WPCF: Water Pollution Control Federation (named changed to WEF)
MGD: Million Gallons per Day	WTP: Water Treatment Plant
MIL: Designation for United States Military Standards	WWTP: Wastewater Treatment Plant

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