

# **A FUNDAMENTAL GUIDE TO VALVE TERMINOLOGY**



## **MILWAUKEE VALVE**

**A COLLECTION OF VALVE LINGO,  
JARGON AND ACRONYMS**

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## A FUNDAMENTAL GUIDE TO VALVE TERMINOLOGY

### GLOSSARY OF VALVE TERMS

**Actuator** Device used to open, close, or position a valve using electric, pneumatic, or mechanical hydraulic means. Often used for remote control or sequencing of valve operations.

**All Iron** Trim class used in cast iron valves wherein the seating surfaces and stem are made of iron or steel.

**Alloy** A combination of two or more metals, or a metal and a non-metal substance, that is heated until the combined substances are blended together to form a new material.

**Ambient Temperature** The prevailing temperature of the environment immediately surrounding a valve - generally considered to be -20°F to +100°F.

**Angle Valve** A valve that changes the direction of the flow by 90°.

**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 packing box when the valve is fully opened.

**Backflow Preventer** A device used to prevent the reverse or backflow of water in a piping system.

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

**Bevel Gear Actuator** Gear mechanism facilitating operation of a gate or globe valve by means of a beveled ring gear driven by a pinion gear oriented at a right angle.

**Bi-Directional Shutoff** A valve having equivalent flow and shut-off capability to the rated pressure in both directions.

**Blind Flange** A flange with no flow-way bore, used to provide pressure-tight closure of a flanged opening.

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

**Boiler Drain** (1) A faucet with male hose threads. (2) A faucet for hot or cold water connections to a washing machine. (3) A faucet used as a water heater drain. Also called a water heater drain.

**Bolted Bonnet (BB)** A bonnet which is connected to a valve body with bolts or studs and nuts.

**Bonnet** The top part of a valve, attached to the body, which contains the packing gland, guides the stem, and adapts to extensions or operators.

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**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.

**Brazing** A metal joining process in which two or more metals are joined together by melting and flowing a filler metal (alloy) that is above 840°F into the joint, with the filler metal having a lower melting point than the adjoining metal.

**Bubble Tight** Test acceptance criteria wherein a closed valve is tested with pressurized air and a pool of water over the closure member with no visual indication of air bubbles during the test.

**Butt Weld** A connection where the valve end and pipe end diameters are equal. The outside edge of each end is chamfered, or partially beveled, so that when the ends butt together they create a small valley that will hold the welding material. Butt weld connections are usually used on smaller diameter connections of 2" and less.

**Butterfly Valve** A quarter-turn valve that uses a flat disk that pivots on a stem to allow or prevent flow.

**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 2% to 4%. Cast iron is brittle, exhibiting very little ductility before fracturing.

**Cavitation** Rapid formation and collapse of vapor pockets in flowing fluid immediately downstream of a throttling valve.

**Chainwheel** Manual actuator that uses a chain-driven wheel to turn a valve stem, handwheel, or gearing.

**Check Valve** A one-directional (unidirectional) valve which is opened by the fluid flow in one direction and closed automatically when the flow stops or is reversed.

**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.

**Closure Element** The moving part of a valve, positioned in the flow stream, which controls the flow through the valve, e.g., wedge, plug, disc, ball.

**Contractor** The **firm** responsible for supervising the installation of the piping system. The Contractor is responsible for making sure the correct components are attached to specific equipment within the correct system. The Contractor hires and manages the installers to execute the vision of the Specifying Engineer.

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**C<sub>v</sub> 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.

**CWP Cold Working Pressure** The maximum allowable pressure under non-shock conditions at ambient temperature ( -20° F to +100° F).

**Cycle of Operation** Actuation of a valve from one limit of its operational position to the opposite limit and return to its original position.

**Deadman's Handle** (spring-return handle) A handle that must be engaged in order to stay open so that if the operator is incapacitated, that portion of the system is shut down.

**Design Pressure** Maximum fluid pressure that a valve or piping system is designed for use.

**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.)

**Elastomer** A natural or synthetic elastic material often used for O-ring seals. Typical materials are Viton, Buna-n, EPDM (ethylene propylene di-monomer), etc.

**End Connection** The type of connection supplied on the ends of a valve which allows it to be connected to piping – may be flanged-end, socketweld, threaded or weld-end.

**Engineer** Refers to the Specifying Engineer, who design, specify, and commission mechanical, electrical, plumbing (MEP), fire/life safety, lighting, and controls systems for nonresidential buildings. Engineers are responsible for producing systems that meet codes and standards for the various systems within commercial, institutional and industrial buildings.

**Equal Percentage** Inherent flow characteristic in which equal increments of valve travel produce equal percentage changes in flow rate.

**Equivalent Pipe Length** Measure of a valve's resistance to flow where the resistance is equal to and expressed as a length of pipe of the same size as the valve.

**Expansion Joint** Pressure-tight connection device that accommodates relative movement of the attached piping.

**Face-To-Face Dimension** The overall dimension from the inlet face of a valve to the outlet face of a valve (one end to another) allowing valves of the same size and pressure class to be mutually interchangeable, regardless of manufacturer.

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**Facing** The finish of the gasket contact surface of a flange.

**Fail-Safe Position** Pre-determined position in which the valve travels upon loss of the external power source.

**Ferrous Metals** Metals that contain iron. Metals that do not contain iron are non-ferrous metals.

**Fire Safe** A valve design that can pass a fire test with specified limits on leakage to the atmosphere and downstream after being closed subsequent to fire exposure.

**Flange** A round ring affixed to pipe by threading or welding for use in connecting piping and other components by use of mechanical fasteners.

**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 design in which the ball is not rigidly held on its rotational axis and so is free to float between the seat rings.

**Full Port (Full Bore)** Describes a valve in which the bore (port) is nominally equal to the bore of the connecting pipe.

**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 squeezed by means of bolting to effect the seal.

**Gate Valve** A straight through pattern valve in which closure element is a wedge 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. Used as a block valve, or on-off valve.

**Gland or Gland Bushing** The part of the valve which retains or compresses the stem packing in a stuffing box.

**Gland Follower or Gland Flange** The component used to hold down or retain the gland in the stuffing box.

**Globe Valve** A valve whose closure element is a flat disc or conical plug sealing on a seat which is usually parallel to the flow axis. Can be used for throttling services.

**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 effect the seal.

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

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**Hanger** A device used to support pipe in a piping system and prevent sag, sway and other undesired movement.

**Hardfacing** 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.

**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.

**Hydronic Heating System** A heating system made up of a boiler to heat water; a system of pipes, fittings and valves to control water flow; and heat-releasing devices, such as radiators or under-floor tubes, to release heat from the hot water into the rooms to be heated.

**Hydrostatic test** A pressure test in which a valve is tested with water to detect leaks - may be a shell test or a seat closure test.

**IBBM Iron Body, Bronze Mounted** Common term for valves with cast iron body and bonnet and bronze trim (seating surfaces, stem, bushings).

**Industrial Piping** A piping system used in a manufacturing plant, factory, processing plant, laboratory, or other commercial application.

**ID Inside Diameter** The distance of a straight line passing through the center of a pipe or fitting from one inside pipe wall to the other inside wall.

**Installer** The person who turns the wrench or sweats the fitting.

**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.

**Lift-Check Valve** A valve that prevents reverse flow by means of a suspended disk that is pushed out of the way by forward flow, but is forced closed against a seat if reverse flow occurs.

**Live Loading** Means of maintaining a compressive load on bolted assemblies, such as by using disc springs on a packing gland.

**Material Test Reports** Certificates provided by the steel manufacturer indicating the chemical analysis and mechanical properties of a specific batch of steel traced by sequentially assigned heat numbers or codes.

**Nipple** A male fitting that is a short piece of pipe, plain inside and threaded on either outside end that is used to connect pipes, valves and fittings.

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

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**NPT National Pipe Thread** Standard tapered thread for pressure pipe and components. Requirements defined in ASME B1.20.1.

**NRS 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 the line fluid.

**OD Outside Diameter** The distance of a straight line passing through the center from one outside wall of the pipe to the other outside wall.

**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.

**Oxygen Cleaning** Method of cleaning equipment intended for use with either liquid or gaseous oxygen. Oxygen cleaning eliminates fire or explosion danger due to flammable contaminants. When being used for medical purposes, oxygen cleaning removes contaminants that can cause direct bodily harm.

**Packing** The deformable sealing material inserted into a valve stuffing box which when compressed by the gland provides a tight seal about the stem.

**Packing Box** The annular chamber provided around a valve stem in a sealing system into which deformable packing is placed. Sometimes called stuffing box or packing chamber.

**Port** The hole that provides a passageway for flow through the closing mechanism of the valve.

**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.

**Pump** A device that raises, transfers or compresses fluids or gases by suction, pressure or both.

**Raised Faced (RF)** The raised area of a flange face which is the gasket sealing surface between mating flanges. Defined in ASME B16.5. Class 150 and 300 valves have 0.06" RF and Class 600 and up have a 0.25" RF.

**Reduced Port** A valve port opening that is smaller than the line size or the valve end connection size, usually two pipe sizes smaller.

**Reducer** (Also called Double-Reduced) A fitting that is larger at one end than at the other; is used to join two pipes of different diameters to either increase or reduce flow depending on desired conditions.

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**Ring Type Joint (RTJ)** A flange connection using a specially shaped soft metal ring as a gasket. Generally used on high pressure valves. May be the body and bonnet connection and/or the end flange connection.

**Resilient Seat** A valve seat containing a soft seal such as an o-ring or plastic to assure tight shut-off.

**Riser** (1) Any vertical pipe which extends one story or more in a water supply system; (2) The principal vertical supply pipe.

**RS Rising Stem** A valve stem with threads arranged so that as the stem turns, the threads engage a stationary threaded area and lift the stem along with the closure element attached to it.

**Run** (1) The part of the pipe that lies on a straight line in the direction of the flow; (2) The straight portion between two ends of a fitting.

**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 effects a tight shut-off.

**Shell Test** A test of the valve pressure boundary, at a pressure in excess of the cold working pressure rating of the valve, for the purpose of validating the soundness and strength of the valve and its attached pressure containing structures.

**Slip-On Flange** Flange that slips over the end of the pipe and is fillet welded in place.

**Socketweld End (SW)** The end connection of a valve suitably prepared for Socket welding to a connecting pipe.

**Soldering** A metal joining process in which two or more metals are joined together by melting and flowing a filler metal (alloy) that is below 840°F into the joint, with the filler metal having a lower melting point than the adjoining metal.

**Square Operating Nut** A nut, usually 2" x 2", which is attached to a valve stem or the pinion shaft of a gear operator allowing use of wrenches to quickly operate the valve.

**Stainless Steel** Any of a number of types of iron alloy with chrome, nickel, or other elements that does not oxidize in free air.

**Standard Port** (also called single-reduced, regular-port or standard-bore) refers to a valve that has a reduced flow at the closure member. In a ball valve, this is usually a flow port that is ONE pipe size smaller than a full port opening.

**Stem** The rod or shaft transmitting motion from an operator (handwheel or gear operator) to the closure element of the valve.



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**Sweat** Slang for the act of soldering a valve in place.

**Swing Check Valve** A check valve in which the closure element is a hinged clapper which swings or rotates about a supporting shaft.

**Tapped** Having female pipe threads.

**Throttling** The intentional restriction of flow by partially closing or opening a valve.

**Torque** The rotational force imposed on or through a shaft, usually expressed in foot-pounds.

**Trim** Commonly refers to the valve's working parts and to their materials. Usually includes seat ring sealing surfaces, closure element sealing surfaces, stems, and back seats. Trim numbers which specify the materials are defined in API 600 and API 602.

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

**Union Bonnet** A type of valve construction in which the bonnet is held on by a union nut with threads on the body. Valve A device used to control the flow of fluid contained in a pipeline.

**Vented Ball** Has a small hole drilled into its upstream side to relieve the potential for pressure buildup in the ball cavity.

**Welding-Neck Flange** Flange with a tapered hub, bored to match the inside diameter of matching pipe, and with the hub beveled for butt welding to the pipe.

**WOG** Water-Oil-Gas - a rating designation generally used for small valves chiefly in low ratings. Indicates maximum working pressure at ambient + 32° F to +100° F. Also called Non-shock Rating.

**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.

**Yoke** The part of gate or globe valve which acts as a bracket to support the top or outer end of the stem and stem bearing.

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### **STANDARDS ORGANIZATION ACRONYMS**

**ANSI American National Standards Institute** serves as administrator of the US standardization system by accrediting the procedures of Standard Development Organizations (SDO's).

**API American Petroleum Institute** trade association and SDO that publishes standards related to the oil & gas industry.

**ASME American Society of Mechanical Engineers** publishes codes, standards, and specifications for systems, components, testing, and materials involved in mechanical and multi-disciplinary engineering fields.

**ASTM American Society for Testing and Materials** publishes technical standards for a wide range of materials, products, systems, and services.

**AWWA American Water Works Association** publishes industry standards for valves and piping used in water systems.

**CDA Copper Development Association** publishes chemical specifications for copper alloys in support of the ASTM specifications.

**CSA (Group) Canadian Standards Association** publishes standards for fuel gas systems and gas appliance applications, while also providing product testing and certification services.

**FM Factory Mutual Approvals** provides global commercial and industrial third-party testing and certification services.

**IAPMO International Association of Plumbing and Mechanical Officials** provides product certifications, training materials, and publishes codes & standards including the Uniform Plumbing Code and Uniform Mechanical Code.

**MSS Manufacturers Standardization Society of the Valve and Fittings Industry** develops and publishes Standard Practices specifically for manufacturers and users of products involving valves and fittings.

**NSF (International) National Sanitation Foundation** serves to protect human health by publishing public health standards and provide certifications that help protect food, water, and the environment.

**UL Underwriter's Laboratories** global safety certification organization publishing safety and performance standards and provides testing for components used in fire-protection or hazardous fluid systems.

**WQA Water Quality Association** trade association representing the residential, commercial, and industrial water treatment industry in the US and certifies products to various codes and standards.