

Glossary of Irrigation Terms

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This document is in continuing development. You are encouraged to submit definitions along with their source to info@irrigation.org. The terms in this glossary are presented in an effort to provide a foundation for common understanding in communications covering irrigation. The following provides additional information:

- Items located within brackets, [], indicate the IA-preferred abbreviation or acronym for the term specified.
- Items located within braces, { }, indicate quantitative IA-preferred units for the term specified.
- General definitions of terms not used in mathematical equations are not flagged in any way.
- Three dots (...) at the end of a definition indicate that the definition has been truncated.
- Terms with strike-through are non-preferred usage.
- References are provided for the convenience of the reader and do not infer original reference.

Additional soil science terms may be found at www.soils.org/publications/soils-glossary#.

A

AC {hertz}: Abbreviation for alternating current.

AC pipe: Asbestos-cement pipe was commonly used for buried pipelines. It combines strength with light weight and is immune to rust and corrosion. (James, 1988) (No longer made.)

acceleration of gravity. See **gravity (acceleration due to)**.

acid precipitation: Atmospheric precipitation that is below pH 7 and is often composed of the hydrolyzed by-products from oxidized halogen, nitrogen, and sulfur substances. (*Glossary of Soil Science Terms*, 2013)

acid soil: Soil with a pH value less than 7.0. (*Glossary of Soil Science Terms*, 2013)

adhesion: Forces of attraction between unlike molecules, e.g. water and solid. (*Glossary of Soil Science Terms*, 2013)

adjusted sodium adsorption ratio [adj. R_{Na}]: Index of permeability problems, based upon water quality. (Burt, 1998)

adsorption: The process by which atoms, molecules, or ions are taken up from the soil solution or soil atmosphere and retained on the surfaces of solids by chemical or physical binding. (*Glossary of Soil Science Terms*, 2013)

advance ratio [AR]: Ratio of the time for the water to reach the end of the field to the total set time for an irrigation set on a furrow irrigation system. The ratio should be less than 0.5 to have a good distribution uniformity. (Burt, Surface Irrigation)

advance time {min, s}: Time required for a given stream of irrigation water to move from the upper end of a field to the lower end. (ASAE, 2007)

aeration soil: A diffusion process by which air in soil pore spaces is replaced by air from the atmosphere, replenishing soil oxygen and removing excess soil carbon dioxide.

aeration capacity: Volume fraction of air-filled pores in a soil at field capacity. (Hess, 1999)

aeration water: A process by which oxygen from the atmosphere is added to water bodies or flowing water. (ASAE, 2007)

aggregate: Group of primary soil particles that cohere to each other more strongly than to other surrounding particles. (*Glossary of Soil Science Terms*, 2013)

air gap: See **backflow prevention device**.

alfalfa valve: Outlet valve attached to the top of a pipeline riser with an opening equal in diameter to the inside diameter of the riser pipe and an adjustable lid or cover to control water flow... (ASAE, 2007)

algicide: Substance that will kill or control algal growth. (ASAE S526.3 SSP, 2007)

alkaline (alkali) soils: Soil with pH greater than 7.0. (*Glossary of Soil Science Terms*, 2013)

allowable depletion [AD] {in., mm}:

- Portion of plant available water that is allowed for plant use prior to irrigation based on plant and management considerations.
- That part of soil moisture stored in the plant root zone managed for use by plants, usually expressed as equivalent depth of water in acre inches per acre, or inches. (NRCS)
- Sometimes referred to as allowable soil depletion or allowable soil water depletion.

allowable stress factor: See **coefficient**.

allowable voltage loss [AVL] {volts}: Voltage loss in a circuit or portion of a circuit which, if not exceeded, will result in the electrical device working correctly.

alternate set irrigation: See **irrigation systems**.

alternate side irrigation: See **irrigation systems**.

alternating current [AC]: Current in which the flow of electrons in a circuit flow in one direction and then in the reverse direction. (*Principles of Irrigation*, 2012)

ampere {ampere or amp}: Unit of electrical current. The unit is used to specify the movement of electrical charge per unit time through a conductor. (*Principles of Irrigation*, 2012)

anion: An atom or atomic group that is negatively charged because of a gain in electrons. (*Glossary of Soil Science Terms*, 2013)

application efficiency: See **efficiency**.

application efficiency of lower quarter: See **efficiency**.

application efficiency low half: See **efficiency**.

application rate {in./h}: Rate that water is applied to a given area. Usually expressed in units of depth per time. See also **precipitation rate**. (ASAE, 2007)

application time, set time {min, h}: Amount of time that water is applied to an irrigation set. (ASAE, 2007)

aquiclude: Underground geologic formation that neither yields nor allows the passage of an appreciable quantity of water, although it may be saturated with water itself. (ASAE, 2007)

aquifer: A geologic formation that holds and yields useable amounts of water. Aquifers can be classified as confined or unconfined. (ASAE, 2007)

aquitard: Underground geologic formation that is slightly permeable and yields inappreciable amounts of water when compared to an aquifer. (ASAE, 2007)

arc {degrees}: Portion of a full circle (360 degrees) covered by a part-circle sprinkler.

arid climate: See **climate**.

artesian aquifer: Aquifer that contains water under pressure as a result of hydrostatic head. For artesian conditions to exist, an aquifer must be overlain by a confining material or aquiclude and receive a supply of water. The free water surface stands at a higher elevation than the top confining layer. (ASAE, 2007)

atmospheric pressure [P_a] {psi, ft water, atmospheres, kPa}: Absolute pressure measured at any location. Standard atmospheric pressure at sea level is defined as 14.7 psi or 34.0 feet of water.

atmospheric vacuum breaker: See **backflow prevention device**.

automatic drain valve: See **valve**.

available soil moisture [ASM] {in., mm}: Difference at any given time between the actual soil moisture content in the root zone soil and the permanent wilting point. (*On-farm Committee, 1979*)

available soil moisture capacity [AMC]: See **available water**.

available water [AW] {%, in./ft, mm/mm}: The amount of water released between in situ field capacity and the permanent wilting point. See also **available water holding capacity**. (*Principles of Irrigation, 2012 and Glossary of Soil Science Terms, 2013*).

available water holding capacity [AWHC] {in./ft, mm/mm}: Preferred term is **available water**.

available water storage capacity [AWSC] {in./ft, mm/mm}: Preferred term is **available water**.

average annual precipitation {in., mm}: Long-term historic (generally 30 years or more) arithmetic mean of precipitation (rain, snow, dew) received by an area. (NRCS)

AVB: See **atmospheric vacuum breaker** under **backflow prevention devices**.

B

backflow: Any unwanted flow of used or nonpotable water or substance from any domestic, industrial or institutional piping system into the pure, potable water distribution system. The direction of flow under these conditions is in the reverse direction from that intended by the system and normally assumed by the owner of the system. (USC, 1998)

backflow prevention device [BPD]: Safety device which prevents the flow of water from the water distribution system back to the water source. (ASAE, 2007)

- **air gap:** Physical separation of the supply pipe by at least two pipe diameters (never less than 1 inch) vertically above the overflow rim of the receiving vessel. In this case, line pressure is lost. Therefore, a booster pump is usually needed downstream, unless the flow of the water by gravity is sufficient for the water use. With an air gap there is no direct connection between the supply main and the equipment. An air gap may be used to protect against a contaminant or a pollutant and will protect against both backsiphonage and backpressure. An air gap is the only acceptable means of protecting against lethal hazards. (USC, 1998)
- **atmospheric vacuum breaker** [AVB]: Backflow device configured with a single moving part, a float, which moves up or down to allow atmospheric air into the piping system. (USC, 1998)
- **double check assembly** [DC]: Two internally loaded, independently operating check valves together with tightly closing resilient seated shutoff valves upstream and downstream of the check valves. Additionally, there are resilient seated test cocks for testing of the assembly. The DC may be used to protect against a pollutant only. However, this assembly is suitable for protection against either backsiphonage or backpressure. (USC, 1998)
- **pressure vacuum breaker** [PVB]: Backflow device configured with a spring-loaded float and an independent spring-loaded check valve. (Rochester, 1995)
- **reduced pressure principle assembly** [RP, RPA, RPZ]: Consists of two internally loaded independently operating check valves and a mechanically independent, hydraulically dependent relief valve located between the check valves. This relief valve is designed to maintain a zone of reduced pressure between the two check valves at all times. The RP also contains tightly closing, resilient seated shutoff valves upstream and downstream of the check valves along with resilient seated test cocks. This assembly is used for the protection of the potable water supply from either pollutants or contaminants and may be used to protect against either backsiphonage or backpressure. (USC, 1998)

back pressure, backpressure: Increase of pressure in the downstream piping system above the supply pressure at the point of consideration which would cause, or tend to cause, a reversal of the normal direction of flow. (ASAE, 2007)

back siphonage, backsiphonage: Reversal of flow (backflow) due to a reduction in system pressure which causes a negative or sub-atmospheric pressure to exist at a site in the water system. (ASAE, 2007)

backwash: A procedure that flushes clean water through a filter tank in reverse direction to the normal operating direction to remove captured organic and inorganic particulates from the filter media (also referred to as backflush and/or reverse flushing). (ASAE 2007)

basic intake rate: See **intake rate**.

basin irrigation: See **irrigation systems**.

beds-in-basins: Ridges raised above the ponded water surface of a level basin, with channels between (dead level furrows or basin furrows). (ASAE 2007)

beneficial uses: See **uses**.

best efficiency point: See **efficiency**.

best management practice [BPM]: An irrigation BMP is a voluntary irrigation practice that is both economical and practical and is designed to reduce water consumption and protect water quality while maintaining plant health at the desired level. (John Ossa, Committee Chair, IA Water Management Committee, Nov. 2000)

black water: Water containing liquid and solid human body waste generated through toilet usage. (ASAE, 2007)

Blaney-Criddle Method: Air temperature-based method to estimate crop evapotranspiration. (NRCS)

biochemical oxygen demand [BOD]: The quantity of oxygen used in the biochemical oxidation of organic and inorganic matter in a specified time, at a specified temperature, and in specified conditions. An indirect measure of the concentration of biologically degradable material present in organic wastes. (*Glossary of Soil Science Terms*, 2013)

border dike: Earth ridge or small levee built to guide or hold irrigation or recharge water in a field. (ASAE, 2007)

border ditch: Small excavation used as a border of an irrigated strip or plot with water being spread from one or both sides. (ASAE, 2007)

border irrigation: See **irrigation systems**.

brake horsepower: See **horsepower**.

brake horsepower hour: See **work**.

British thermal units {BTU}: Amount of heat required to raise the temperature of 1 pound of water from 63 to 64 degrees Fahrenheit. ...

bubbler: Water emission device that tends to bubble water directly to the ground or that throws water a short distance, on the order of 1 foot (300 mm), before water contacts the ground surface. (Smith, 1997)

bubbler irrigation: See **irrigation systems**.

bulk density (of soil) [BD_{soil}] {lb/ft³} {g/cc}: Mass of dry soil per [unit] bulk volume ... (generally ranging in value from 1.3 to 1.6 g/cc) (ASAE, 2007)

bulk density (of water) [BD_{water}] {lb/ft³} {g/cc}: Mass of water per unit bulk volume (approximately 1.0 g/cc, 62.4 lb/ft³). Same as **density (of water)**.

C

cable tow traveler: See **irrigation systems**.

cablegation: See **irrigation systems**.

capillary water: Water held in the capillary, or small pores of the soil, usually with soil water pressure (tension) greater than 1/3 bar. Capillary water can move in any direction. (NRCS)

carryover soil moisture {in., mm}: Moisture stored in the soil within the root zone during the winter, at times when the crop is dormant, or before the crop is planted. This moisture is available to help meet water needs of the next crop to be grown. (NRCS)

catch can: Containers spaced at regular intervals for collecting water for use in a water audit (sprinkler profile test). (*Performance Audit Laboratory Student Workbook*, Irrigation Association, April 2012)

cation: Positively charged ion which during electrolysis is attracted toward the cathode. Sodium, potassium, calcium and magnesium are the most common cations in waters and soil extracts. (Hess, 1999)

cation exchange capacity [CEC] {cmol/kg}: The sum of exchangeable cations (usually Ca, Mg, K, Na, Al, H) that the soil constituent or other material can adsorb at a specific pH, usually expressed in centimoles of charge per Kg of exchanger (cmol/Kg) or milli equivalents per 100 grams of soil at neutrality (pH = 7.0), meq/100 g. (*Glossary of Soil Science Terms*, 2013)

cavitation:

- Process where pressure in the suction line falls below the vapor pressure of the liquid, vapor is formed and moves with the liquid flow. These vapor bubbles or "cavities" collapse when they reach regions of higher pressure on their way through pumps. (Pumps, 1998)
- The sudden formation and collapse of low-pressure bubbles in liquids by means of mechanical forces, such as those resulting from rotation of a marine propeller. (Thefreedictionary.com)
- See *Irrigation, Sixth Edition*.

CEC: See **cation exchange capacity**.

center pivot irrigation: See **irrigation systems**.

centrifugal pump: See **pumps**.

certified agricultural irrigation specialist [CAIS]: The certified agricultural irrigation specialist is involved in the management and operation of on-farm irrigation systems. These systems include surface irrigation methods, as well as pressurized systems like microirrigation and sprinklers. See www.irrigation.org/ for details.

certified golf irrigation auditor [CGIA]: The certified golf irrigation auditor is involved in the analysis of turf irrigation water use tailored to the unique conditions found on golf courses. Golf auditors collect site data, make maintenance recommendations and perform water audits on golf courses. Through their analytical work at the site, these irrigation professionals develop base schedules for greens/tees, fairways and roughs. See www.irrigation.org/ for details.

certified irrigation contractor [CIC]: The certified irrigation contractor is an irrigation professional whose principle business is the execution of contracts and subcontracts to install, repair and maintain irrigation systems. The CIC must conduct business in such a manner that projects meet the specifications and requirements of the contract. See www.irrigation.org/ for details.

certified irrigation designer [CID]: The certified irrigation designer engages in the preparation of professional irrigation designs. They evaluate site conditions and determine net irrigation requirements based on the needs of the project. The designer is then responsible for the selection of the most effective irrigation equipment and design methods. The objective of a CID is to establish specifications and design drawings for the construction of an irrigation project. See www.irrigation.org/ for details.

certified irrigation technicians [CIT]: Certified irrigation technicians are the field technicians that help install, maintain and repair irrigation systems. See www.irrigation.org for details.

certified landscape irrigation auditor [CLIA]: The certified landscape irrigation auditor is involved in the analysis of landscape irrigation water use. Auditors collect site data, make maintenance recommendations and perform water audits. Through their analytical work at the site, these irrigation professionals develop monthly irrigation base schedules. See www.irrigation.org/ for details.

certified landscape water manager [CLWM]: The certified landscape water manager is an irrigation professional familiar with areas of turf irrigation design and project water management. CLWMs must be certified as either a CLIA or CGIA. Certified landscape water managers have extensive experience in understanding plant water needs and auditing of turf irrigation systems.

check, check structure: Structure to control water depth in a canal, ditch or irrigated field. (ASAE, 2007)

check basin irrigation: See **irrigation systems**.

check irrigation: See **irrigation systems**.

check valve: See **valve, check**.

chemigation: Application of chemicals to crops through an irrigation system by mixing them with the irrigation water. (ASAE, 2007)

Christiansen's uniformity coefficient: See **uniformity coefficient**.

circular mil [CM] {circular mils}: Unit of measure used to report the cross sectional area of a wire conductor. (*Principles of Irrigation*, 2012)

class (pipe):

- Term generally used to describe the pressure rating of SDR-PR (standard dimension ratio-pressure rated) PVC pipe. For example, a class 200 pipe has a pressure rating of 200 psi. (colloquial)
- Term used to identify the physical characteristics of thermoplastic pipe. (ASTM standard D1784-81)

classification, soil: The systematic arrangement of soils into groups or categories on the basis of their characteristics. (*Glossary of Soil Science Terms*, 2013)

clay: Soil separate consisting of particles less than 0.002 millimeters in equivalent diameter. See also **texture (soil)**. (*NRCS Soil Survey Manual*)

clay loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

climate:

- **arid climate:** Climate characterized by low rainfall and high evaporation potential. A region is usually considered as arid when precipitation averages less than 10 inches per year. (NRCS)
- **humid climate:** Climate characterized by high rainfall and low evaporation potential. A region generally is considered as humid when precipitation averages more than 40 inches per year. (NRCS)
- **semiarid climate:** Climate characterized as neither entirely arid nor humid, but intermediate between the two conditions. A region is usually considered as semiarid when precipitation averages between 10 and 20 inches per year. (NRCS)
- **subhumid climate:** Climate characterized by moderate rainfall and moderate to high evaporation potential. A region is usually considered subhumid when precipitation averages more than 20 inches per year but less than 40 inches per year. (NRCS)

coefficient [k, K]: Various forms of "k" are used to describe constants, coefficients and factors.

- **allowable stress factor** [K_{as}]: Ratio of the actual crop evapotranspiration to its potential (or reference) evapotranspiration. (NRCS, 1997)
- **crop coefficient** [K_c]: Ratio between crop evapotranspiration and the reference crop ET when crop is grown in large fields under optimum growing conditions. (NRCS)
- **vegetation density factor** [K_g]: Vegetation density refers to the collective leaf area of the plants covering or shading an area of ground. (*Landscape Irrigation Auditor, 2nd Edition*, 2010)
- **landscape coefficient** [K_L]: The landscape coefficient is used to adjust reference ET to more appropriately estimate specific plant or turf water needs in the landscape. (*Landscape Irrigation Auditor, 2nd Edition*, 2010)
- **microclimate factor** [K_{mc}]: Factor used to adjust landscape coefficient. (*Landscape Irrigation Auditor, 2nd Edition*, 2010)
- **pan coefficient:** Factor to relate actual evapotranspiration of a crop to the rate water evaporates from a free water surface in a shallow pan. The coefficient usually changes by crop growth stage. (NRCS)
- **plant factor** [K_p]: Factor used to adjust landscape coefficient. (*Landscape Irrigation Auditor, 2nd Edition*, 2010)
- **species factor** [K_s]: Factor or coefficient used to adjust reference evapotranspiration to reflect plant species. (Landscape, 2004)
- **turf factor** [K_T]: Factor used to adjust landscape coefficient. (*Landscape Irrigation Auditor, 2nd Edition*, 2010)

coefficient, consumptive use [ICUC] [%]: Ratio of volume of irrigation water consumptively used to the total volume of irrigation water that has left the region, both in a specified period of time. (Burt et al., 1997)

coefficient of retardation [C, f]: Value describing the hydraulic frictional characteristics of a pipe material. (*Principles of Irrigation*, 2012)

coefficient of runoff [C]: Runoff coefficient used in the rational method of predicting a design peak runoff rate. It helps to characterize runoff rate from a watershed area. (Schwab et al., 1993)

coefficient of manufacturing variation: See **manufacturer's coefficient of variation**.

coefficient of uniformity: See **uniformity coefficient**.

cohesion: Forces of attraction between like molecules, e.g., water to water. (*Glossary of Soil Science Terms*, 2013)

compensating emitter: See **emitter**.

confined aquifer: An aquifer whose upper, and perhaps lower, boundary is defined by a layer of natural material that does not transmit water readily. (ASAE, 2007)

consumptive use: See **uses**.

continuous-flow irrigation: System of irrigation water delivery where each irrigator receives the allotted quantity of water continuously. (ASAE, 2007)

continuous flushing emitter: See **emitter**.

control station (microirrigation): Facilities upstream of microirrigation distribution and application piping for purposes that may include water measurement, filtration, treatment, flow and pressure control, timing of application, and/or backflow prevention. Sometimes called a "control head." (ASAE, 2007)

control structure: Water regulating structure, usually for open channel flow conditions. (NRCS)

controller:

- An electric timing device that operates each (irrigation) zone for a predetermined time and frequency. (Keesen, 1995)
- An automatic timing device that sends an electric signal for automatic valves to open or close according to a set irrigation schedule. (Reaves, Lower Colorado River Authority)

conveyance efficiency: See **efficiency**.

conveyance loss {ft³}: Loss of water from a channel or pipe during transport, including losses due to seepage, leakage, evaporation, and transpiration by plants growing in or near the channel. (ASAE, 2007)

corporation stop (valve): See **valve**.

corrugation irrigation: See **irrigation systems**.

coupler: Device, either self-sealed or mechanically sealed, that connects the ends of two lengths of pipe or pipe to a hose. (ASAE, 2007)

crop coefficient: See **coefficient**.

crop evapotranspiration: See **evapotranspiration**.

cross connection: Any actual or potential connection or structural arrangement between a public or private potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluids, gas, or substance other than the intended potable water with which the potable system is supplied. By-pass arrangements, jumper connections, removable sections, swivel or change-over arrangements or other "temporary" arrangements through which backflow could occur are considered to be cross-connections. See also **backflow**. (USC, 1998)

crop growth stages: Periods of like plant function during the growing season. Usually four or more periods are identified. (NRCS)

- **initial:** Between planting or when growth begins and approximately 10 percent ground cover.
- **crop development:** Between about 10 percent ground cover and 70 or 80 percent ground cover.
- **mid season:** From 70 or 80 percent ground cover to beginning of maturity.
- **late:** From beginning of maturity to harvest.

crop irrigation requirement: Quantity of water, exclusive of effective precipitation, that is needed for crop production. (ASAE, 2007)

crop rooting depth: See **root zone**.

crop water stress index [CWSI]: Index of moisture in a plant compared to a fully watered plant, measured and calculated by a CWSI instrument. Relative humidity, solar radiation, ambient air temperature, and plant canopy temperature are measured. (NRCS)

crop water use: See **plant water requirement** and **evapotranspiration**.

cumulative intake {in., mm}: Depth of water absorbed by soil from the time of initial water application to the specified elapsed time. (NRCS)

curb stop (valve): See **valve**.

current [I] {amperes, amps}:

- Movement or flow of electrons. (Derryberry, 2007)
- The flow of electrons in a conductor. (Principles of Irrigation, 2012)

cutback stream: Reducing surface irrigation inflow stream size (usually a half or a third) when a specified time period has elapsed or when water has advanced a designated distance down the furrow, corrugation or border. (ASAE, 2007)

cutback irrigation: See **irrigation systems, furrow**.

cycle time {min, h}: Length of water application periods, typically used with surge irrigation. (NRCS)

D

Darcy's law: A concept formulated by Henry Darcy in 1856 to describe the rate of flow of water through porous media. The rate of flow of water in porous media is proportional to, and in the direction of, the hydraulic gradient and inversely proportional to the thickness of the bed. (ASAE, 2007)

deep percolation [DP] {in., mm}:

- Movement of water downward through the soil profile below the root zone that cannot be used by plants. (ASAE, 2007)
- Infiltrated water, which moves below the root zone. (Burt et al., 1997)

deficit irrigation: Irrigation water management alternative where the soil in the plant root zone is not refilled to field capacity in all or part of the field. (NRCS)

deep percolation percentage [DP] {%}: Ratio of the average depth of irrigation water infiltrated and drained out of the root zone to the average depth of irrigation water applied. (ASAE, 2007)

degree of hazard: The type of backflow preventer used to prevent backflow from occurring at the point of a cross-connection depends on the type of substance which may flow into the potable water supply. A pollutant is considered to be any substance that would affect the color or odor of the water, but would not pose a health hazard. This is also considered a nonhealth hazard. A substance is considered a health hazard if it causes illness or death if ingested. This health hazard is called a contaminant. (USC, 1998)

delivery box (irrigation):

- Structure diverting water from a canal to a farm unit often including measuring devices. Also called "turnout." (ASAE, 2007)
- Water control structure for diverting water from a canal to a farm unit often including a measuring device. Also called delivery site, delivery facility, and turnout. (NRCS)

delivery loss: Preferred term is **conveyance loss**.

demand irrigation (system) (delivery): Procedure where each irrigator may request irrigation water in the amount needed and at the time desired. (ASAE, 2007)

density (of water) {g/cc, lb/ft³}: Mass of water per unit volume. Same as **bulk density** of water.

density factor: See **coefficient**.

densogram: Pattern of dots that shows the expected coverage from a particular combination of sprinklers, nozzles, pressure and spacing. (Solomon, 1988)

depth [d, D] {in., mm}: General term relating to depth of soil, water, or similar.

depth of irrigation {acre in. per acre, in., ft, mm}:

- Depth of water applied.
- Depth of soil affected by an irrigation event. (NRCS)

design application efficiency: Computed water application efficiency when water is applied at design rate and design time. (ASAE 2007)

diameter [D, d] {in., mm}:

- Dimension/size of a circular pipe, usually but not always the inside diameter [ID]; also includes outside diameter [OD, D] {in., mm} and nominal diameter).

diameter of throw [D_t] {ft, m}: Average diameter of the area wetted by an irrigation sprinkler operating in still air. (ASAE, 1998)

dielectric union: Pipe connection (union) having an insulator between the two sides of the union for the purpose of reducing corrosion caused by galvanic action. (Smith, 1997)

dimension ratio [DR]: Ratio of the average pipe diameter to the minimum wall thickness. The pipe diameter may be either outside or inside diameter. See related term **standard dimension ratio**. (ASAE, 2007)

direct current [DC]: Current in which electrons flow constantly in one direction. (*Principles of Irrigation*, 2012)

distribution system: System of ditches, or conduits and their controls, which conveys water from the supply canal to the farm points of delivery. (ASAE, 2007)

distribution uniformity [DU] {%, decimal}: Measure of the uniformity of irrigation water over an area. (ASAE, 2007).

distribution uniformity of lower quarter [DU_{lq}] {%, decimal}:

- Ratio of the average low quarter depth of irrigation water infiltrated to the average depth of irrigation water infiltrated. (On-farm Committee, 1979)
- Ratio of the average of the lowest one-fourth of measurements of irrigation water infiltrated (or applied) to the average depth of (the total) irrigation water infiltrated (applied). (ASAE, 2007)

disturbed (manipulated) soils: Soils with soil profiles that have been altered because of earth-moving activities (or soil amendment).

diversion box: Structure built into a canal or ditch for dividing the water into predetermined portions and diverting it to other canals or ditches. (ASAE, 2007)

diversion dam: Barrier built in a stream for the purpose of diverting part or all of the water from the stream into a canal. (ASAE, 2007)

doctrine of appropriation: Water law developed in the arid Western states, where water supplies are limited and often inadequate (also known as the Appropriation Doctrine). This doctrine is essentially a rule of capture (first in time of use is first in right), where application of the water to a beneficial use is the basis and measure of the right. (ASAE, 2007)

double check valve assembly: See **backflow prevention device**.

drip irrigation: See **irrigation system, drip**.

drought: Period of dryness, especially when prolonged, that causes extensive damage to crops or prevents their successful growth. (*Webster's Collegiate Dictionary 10th Edition*)

dry weight (of soil sample) [DW] {lbs}{grams}: Oven dry weight of a soil sample. (*Principles of Irrigation*, 2012)

ductile iron: Form of iron used to make pipe and fittings.

dynamic head. See **head, dynamic**.

dynamic pressure {psi, kPa}: Measure of water pressure with the water in motion (also known as working pressure). (Monroe, 1993)

E

effective precipitation [P_e] {in., mm}: Portion of total precipitation which becomes available for plant growth. (ASAE, 2007)

effective rainfall {in., mm}: Portion of total rainfall which becomes available for plant growth. (ASAE, 2007)

effective rooting depth. See **rooting depth, effective**.

efficiency [E] {%, fraction}:

- **application efficiency** [E_a , AE]: The ratio of the average depth of irrigation water infiltrated and stored in the root zone to the average depth of irrigation water applied. (NRCS)
- **application efficiency low half** [E_h]: The ratio of the average of the low one-half of measurements of irrigation water infiltrated and stored in the root zone to the average depth of irrigation water applied, expressed as a percentage. Also referred to as AELH. (ASAE, 2007)
- **application efficiency of lower quarter** [E_{lq}]: The ratio of the average of the lowest one-fourth of measurements of irrigation water infiltrated and stored in the root zone to the average depth of irrigation water applied. (NRCS)
- **best efficiency point** [BEP]: The point on the pump characteristic curve where a centrifugal pump operates at maximum efficiency. (impeller.net)
- **conveyance efficiency** [E_c]: Ratio of the water delivered, to the total water diverted or pumped into an open channel or pipeline at the upstream end. (NRCS)
- **irrigation efficiency** [E_i , IE]: Ratio of the average depth of irrigation water that is beneficially used to the average depth of irrigation water applied ... (ASAE, 2007) (On-farm Committee, 1979)
- **potential application efficiency of low quarter** [PE_{lq}] {%}: Low quarter application efficiency obtainable with a given irrigation system when the depth of irrigation water infiltrated in the quarter of the area receiving the least water equals some predetermined value of the soil moisture deficit. (On-farm Committee, 1979)
- **pumping plant efficiency (overall)** [E_{pp}] {%}: The ratio of the output power into the water to the input power to the driver. (ITRC, 2001)
- **motor efficiency** [E_m]: Ratio of the power delivered to the pump by the power unit to the input power to the motor.
- **project efficiency:** Overall efficiency of irrigation water use in a project setting that accounts for all water uses and losses, such as crop ET, environmental control, salinity control, deep percolation, runoff, ditch and canal leakage, phreatophyte use, wetlands use, operational spills, and open water evaporation. (NRCS)
- **pump efficiency** [E_p]: Ratio of the water power produced by the pump, to the power delivered to the pump by the power unit. (ASAE, 2007)
- **(water) storage efficiency:** Ratio of the amount of water stored in the root zone during irrigation to the amount of water needed to fill the root zone to field capacity. (James, 1988)
- **water use efficiency** [WUE]: Ratio of the yield per unit area to the applied irrigation water per unit area.

effluent irrigation: Land application of wastewater for irrigation and beneficial use of nutrients. (ASAE, 2007)

electrical conductivity [EC] {mmho/cm, dS/m}: Measure of the ability of the soil water to transfer an electrical charge. Use as an indicator for the estimation of salt concentration.

- [EC_e]: Electrical conductivity of soil water extract.
- [EC_i]: Electrical conductivity of irrigation water.
- [EC_{aw}]: Electrical conductivity of applied water. (NRCS)

electrical resistance block: Block made up of various materials containing electrical contact wires that is placed in the soil at selected depths to measure soil moisture content (tension). Electrical resistance, as affected by moisture in the block is read with a meter. (NRCS)

elevation head: See **head**.

emission point: Location where water is discharged from an emitter. (ASAE, 2007)

emission uniformity [EU] {-,%}: Index of the uniformity of emitter discharge rates throughout a microirrigation system. Takes account of both variations in emitters and variations in the pressure under which the emitters operate. (Emission uniformity is also used with other types of irrigation systems.) (ASAE, 2007)

emitter: Small microirrigation dispensing device designed to dissipate pressure and discharge a small uniform flow or trickle of water at a constant discharge, which does not vary significantly because of minor differences in pressure head. Also called a "dripper" or "trickler." (ASAE, 2007)

- **compensating emitter:** See **pressure compensating emitter**.
- **continuous flushing emitter:** Microirrigation system emitter designed to continuously permit passage of large solid particles while operating at a trickle or drip flow, thus reducing filtration requirements. (NRCS)
- **flushing emitter:** Emitter designed to have flushing flow of water to clear the discharge opening every time the system is turned on. (NRCS)
- **line source emitter:** Water is discharged from closely spaced perforations, emitters, or a porous wall along the tubing. (NRCS)
- **long-path emitter:** Emitter which employs a long capillary sized tube or channel to dissipate pressure. (NRCS)
- **multi-outlet emitter:** Device which supplies water to two or more points through small diameter auxiliary tubing. (NRCS)
- **nonpressure compensating emitter:** Emitter designed with a fixed orifice or other components and contains no pressure compensating features.
- **orifice emitter:** Emitter which employs a series of orifices to dissipate pressure. (NRCS)
- **pressure compensating emitter:** Emitter designed to discharge water at a near constant rate over a wide range of lateral line pressures. (NRCS)
- **vortex emitter:** Emitter which employs a vortex effect to dissipate pressure. (NRCS)

entrance loss {ft, m}: Energy lost in eddies and friction at the inlet to a conduit or structure. (ASAE, 2007)

evaporation [E] {in./day, in./wk, mm/wk, mm/month}: The process by which liquid water from soil vaporizes near the soil surface and is lost to the atmosphere. (part of ET) (*Glossary of Soil Science Terms*, 2013)

evaporation pan:

- Standard U.S. Weather Bureau Class A pan (48-inch diameter by 10-inch deep) used to estimate the reference crop evapotranspiration rate. Water levels are measured daily in the pan to determine amount of evaporation.
- Pan or container placed at or about crop canopy height containing water. Water levels are measured daily in the pan to determine the amount of evaporation. (NRCS)

evapotranspiration [ET] {in./day, in./week, mm/wk, mm/day}: Combination of water transpired from vegetation and evaporated from the soil and plant surfaces. (ASAE, 2007)

- **crop** [ET_c]: Crop evapotranspiration is the quantitative amount of ET within the cropped area of a field, which is associated with growing of a crop. (Burt, et al. 1997) Same as **plant water requirement**.
- **potential** [ET_p , E_{tp}]: Rate at which water, if available, would be removed from soil and plant surfaces expressed as the latent heat transfer per unit area or its equivalent depth of water per unit area. (ASAE, 1998 and Jensen, 1980)
- **reference**
 - [ET_o]: Rate of evapotranspiration from an extensive surface cool-season green grass cover of uniform height of 12 centimeters, actively growing, completely shading the ground, and not short of water. (ASCE, 1990)
 - [ET_u]: Upper limit or maximum evapotranspiration that occurs under given climate conditions with a field having a well-watered agricultural crop with an aerodynamically rough surface, such as alfalfa with 50 centimeters of top growth. (ASCE, 1990)

exchange capacity: See **cation exchange capacity**.

exchangeable cation: A positively charged ion held on or near the surface of a solid particle by a negative surface charge of a colloid and which may be replaced by other positively charged ions in the soil solution. (ASAE, 2007)

exchangeable sodium fraction: The fraction of the cation exchange capacity of a soil occupied by sodium ions. (*Glossary of Soil Science Terms*, 2013)

exchangeable sodium percentage [ESP] [%]: Exchangeable sodium fraction expressed as a percentage. (*Glossary of Soil Science Terms*, 2013)

F

fertigation: Application of nutrients through an irrigation system.

field capacity [FC] {in./in., in./ft, %, bars, kPa, mm/m}:

- Moisture remaining in a soil following wetting and natural drainage until free drainage has practically ceased. (On-farm Irrigation Committee, 1978)
- Amount of water remaining in a soil when the downward water flow due to gravity becomes negligible. (ASAE, 2007)

filter, irrigation: Device used in micro and sprinkler irrigation systems to remove debris from the water that might clog or otherwise foul the emitters or sprinklers. (ASAE, 2007)

final infiltration rate: See **basic intake rate**.

FIPT: Acronym for female iron pipe thread. (Smith, 1997)

flood irrigation: See **irrigation systems**.

flow rate [Q or q] {gpm, gph, gal/min, ft³/s, cfs, litres/s, litres/min, m³/h}: Rate of flow or volume per unit period of time.

foot valve: See **valve, foot**.

free drainage: Movement of water by gravitational forces through and below the plant root zone. This water is unavailable for plant use except while passing through the soil. (NRCS)

frequency distribution:

- Values in a sample are grouped into a limited number of classes. A table is made showing the class boundaries and the frequencies (number of members of the sample) in each class. The purpose is to show a compact summary of the data. (Snedecor and Cochran, 1967)
- Measurement and presentation of various fractions of total water applied for selected depth ranges referenced to average depth applied.

friable: Soil consistency term referring to the ease with which the soil aggregates may be crumbled (in the hand), i.e., a friable soil is easily crumbled in the hand. (Hess, 1999)

friction factor: A factor used in several different friction loss equations. Its value depends upon pipe and fluid characteristics and varies depending upon the equation in use. (Rochester, 2013)

friction factor, Christiansen [F]: Friction factor or coefficient used in the Christiansen Procedure to determine pressure loss in a multiple outlet piping system.

friction factor, Darcy Weisbach [f]: Friction factor used with Darcy Weisbach equation. (*Principles of Irrigation*, 2012)

friction loss [h_f] {psi, ft, kPa, m}: Also referred to as **pressure loss**.

- Amount of pressure lost through pipes due to water movement and turbulence.
- As water moves through an irrigation system, pressure is lost because of turbulence created by the moving water. This turbulence can be created in pipes, valves or fittings. These losses are referred to as **friction losses**. (Monroe, 1993)

frost protection: Applying irrigation water to affect air temperature, humidity, and dew point to protect plant tissue from freezing. The primary source of heat (called heat of fusion) occurs when water turns to ice, thus protecting sensitive plant tissue. (NRCS)

full irrigation: Management of water applications to fully replace water used by plants over an entire field. (NRCS)

fungicide: Chemical pesticide that kills fungi or prevents them from causing diseases on plants. (NRCS)

furrow:

- Small channel for conveying irrigation water downslope across the field. Sometimes referred to as a rill or corrugation. (NRCS)
- Trench or channel in the soil made by a tillage tool.

furrow dike: Small earth dike formed in a furrow to prevent water translocation. Typically used with LEPA and LPIC systems. Also used in nonirrigated fields to capture and infiltrate precipitation. Sometimes called reservoir tillage. (NRCS)

furrow irrigation: See **irrigation system, furrow**.

furrow stream: Stream flow in a furrow, corrugation or rill. (NRCS)

G

gate, slide gate: Device used to control the flow of water to, from, or in a pipeline or open channel ... (NRCS)

gated pipe: Portable pipe with small gates installed along one side for distributing irrigation water to corrugations or furrows. (ASAE, 1998)

gear drive sprinkler: See **sprinkler head**.

gpm: Acronym for gallons per minute. See **flow rate**.

gravitational water: Soil water that moves into, through, or out of the soil under the influence of gravity. (NRCS)

gravity (acceleration due to) [g] {ft/s², m/s²}: Acceleration caused by the attraction of the mass of earth to bodies at or near its surface. (i.e., 32.2 ft/sec²).

gray water: Domestic wastewater other than that containing human excreta such as sink drainage, washing machine discharge, or bath water. (ASAE, 1998)

gross irrigation: See **irrigation, gross**.

gross irrigation system capacity: See **system capacity, gross irrigation**

gross water (irrigation) requirement: See **irrigation requirement, gross**.

ground water: Water occurring in the zone of saturation in an aquifer or soil. (NRCS)

growing season {days}: Period, often the frost-free period, during which the climate is such that crops can be produced. (NRCS)

gypsum block: Electrical resistance block in which the material used to absorb water is gypsum. It is used to measure soil water content in non-saline soils. (NRCS)

H

hard hose traveler: See **irrigation system, traveler**.

head [H] {ft, m}:

- **atmospheric pressure (head) [H_a]:** Value of atmospheric pressure at a specific location and condition.
- **head, dynamic {ft, m}:** Specific energy in a flow system. (ASAE, 1998)
- **head, discharge [H_d]:** The difference in elevation between the point at which water leaves the system and the elevation of the impeller. (*Irrigation, Sixth Edition*, 2011)

- **head, elevation** [H_z, Z]: Head as a result of elevation above a defined datum.
- **head, friction** [H_f]: Energy head loss caused by the friction of water flowing through a pipe.
- **head loss** [H_L]: Energy loss in fluid flow. (ASAE, 1998)
- **head loss, converging and diverging pipes** [H_g] {ft, m}: Energy loss associated with water flowing through converging or diverging pipe sections. (*Principles of Irrigation*, 2012)
- **head loss, entrance** [H_e] {ft, m}: Energy loss associated with water flowing through the entrance of a pipe. (*Principles of Irrigation*, 2012)
- **head loss, bends** [H_b] {ft, m}: Energy loss associated with water flowing through a bend in a pipe. (*Principles of Irrigation*, 2012)
- **head, pressure** [H_{pr}]: Pressure energy in a liquid system expresses as the equivalent height of a water column above a given datum. (ASAE, 1998)
- **head, static** [H_s]: Energy associated with a static liquid system composed of elevation and pressure components.
- **head, static discharge**: Static energy components at the discharge of a pump including elevation and pressure.
- **head, static suction**: Vertical distance from the pump centerline to the surface of the liquid when the liquid supply is above the pump. (*Pumps*, 1998)

head, total (dynamic) [H_t, H, TDH]:

- Head required to pump water from its source to the point of discharge. Equal to the static lift plus friction head losses in pipes and fittings plus velocity head. (NRCS)
- Energy in the liquid system expressed as the equivalent height of a water column above a given datum. (ASAE, 1998)

head, total suction: Head required to lift water from the water source to the centerline of the pump plus velocity head, entrance losses and friction losses in suction pipeline. (ASAE, 1998)

head, vapor pressure [H_{vp}]: Pressure head at which the liquid (water) will vaporize or boil at a given temperature.

head, velocity [H_v]:

- Head or energy caused by the velocity of a moving fluid... (ASAE, 1998)
- Amount of pressure required to generate a specific velocity. This is the amount of energy or pressure that is used to make the water move at a given velocity. (Monroe, 1995)

head ditch: Ditch across the upper end of a field used for distributing water in surface irrigation. (ASAE, 1998)

head gate: Water control structure at the entrance to a conduit or canal. (ASAE, 1998)

head loss: See **head**.

head spacing: See **spacing, between sprinklers**.

head-to-head spacing: Spacing of sprinkler heads so that each sprinkler throws water to the adjacent sprinkler.

height (above a datum) [z] {ft, m}: Linear dimension used to describe the vertical distance from a point to a datum.

herbicide: Chemical substance designed to kill or inhibit the growth of plants, especially weeds. (NRCS)

high density polyethylene [HDPE]: One of several forms of polyethylene used to make pipe and other irrigation components.

horizon (soil): Layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics such as color, structure, texture, consistency, kinds and number of organisms present, degree of acidity or alkalinity, etc. (Soil, 2013)

horsepower {hp, kw}:

- **water horsepower** [Whp, WHP]: Energy added to water by a pump. (*Principles of Irrigation*, 2012)
- **input horsepower** [Ihp, IHP]: Energy added to a motor or engine.
- **brake horsepower** [Bhp, BHP]: Power required to drive a pump. (*Principles of Irrigation*, 2012)

hose bib: Valve configured to be mounted on a wall having threads to accommodate the connection of a water hose.

hose drag traveler: See **irrigation system**.

humid climate: See **climate**.

hydrant: Outlet, usually portable, used for connecting surface irrigation pipe to an alfalfa valve outlet. (NRCS)

hydraulic conductivity [K] {in./h, mm/h):

- Coefficient describing the ease at which the soil pores permit water movement. (NRCS, 1990)
- Soil-water characteristic describing the ability of water to flow through a particular soil.

hydraulic valve: See **valve**.

hydrozone: Grouping of plants with similar water requirements so that they can be irrigated with a common zone. (Weinberg and Roberts, 1988)

hygroscopic water: Water which is bound tightly by the soil solids at potential values lower than -31 bars. (NRCS, 1990)

I

ID {in., mm): Abbreviation for inside diameter (usually of a pipe).

impact drive: See **sprinkler head**.

impact drive sprinkler: See **sprinkler head**.

impact power {watts, horsepower):

- Rate at which drops deliver kinetic energy to the soil. (Solomon et al. 1996)
- Kinetic energy of impact on soil per unit volume. (Contractor, 1999)

impact rate {hp/ft², kw/m²): Impact power per unit area. (Solomon et al., 1996)

infiltration: Process of water movement through the soil surface into the soil matrix. See also **intake rate**. (Burt et al., 1997).

infiltration rate [I] {in./h, in.³/h/in.², mm/h): Preferred term is **intake rate**.

- Downward flow of water into the soil at the air-soil interface. (NRCS)
- Volume of water infiltrating through a horizontal unit area of soil surface at any instant. (Hess, 1999)

infiltrometer: Device used to measure the infiltration rate/intake rate of water into soil. (NRCS)

- **ring infiltrometer:** Consists of metal rings that are inserted (driven) into the soil surface and filled with water. The rate at which water enters the soil is observed. (NRCS)
- **sprinkler infiltrometer:** Consists of a sprinkler head(s) that applies water to the soil surface at a range of rates of less-than to greater than soil infiltration rates. Maximum infiltration rates are observed and recorded. (NRCS)
- **flowing infiltrometer:** Consists of an inlet device to apply a specific flow rate to a furrow and a collection sump with a pump to return tailwater to the inlet device. Water infiltrated by the soil in the test section (typically 10 meters) is replaced with water from a reservoir to keep the flow rate constant. The rate of water infiltrated verses time is also plotted. An equation (typically for a curvilinear line) then represents the intake characteristics for that particular soil condition. (NRCS)

initial intake: See **intake**.

input horsepower: See **horsepower**.

inrush current {amps): Current necessary to initially open the solenoid valve. (Smith, 1997)

instantaneous application rate: See **precipitation rate**.

intake family curve: A set of accumulated intake vs. time curves grouped into families having similar border or furrow intake characteristics. (NRCS)

intake, initial {in./h, mm/h}: Depth (rate) of water absorbed by a soil during the period of rapid or comparatively rapid intake following initial application. (NRCS)

intake rate (of soil) [I] {in./h, mm/h}: Rate that (irrigation) water enters the soil at the surface. (NRCS)

intake rate (basic) [I_b] {in./h, mm/h}: Rate at which water percolates into the soil after infiltration has decreased to a low and nearly constant value. (ASAE, 1998)

interception {in., mm}: Part of precipitation or sprinkler irrigation system applied water caught on the vegetation and prevented from reaching the soil surface. (NRCS)

inverted siphon: Closed conduit (for conveying water) with end sections above the middle section; used for crossing under a depression, under a highway or other obstruction. Sometimes called a sag pipe. (NRCS)

IPS: See **iron pipe size**.

iron pipe size [IPS] {in., mm}: One of several systems which specify pipe dimensions.

irrecoverable water loss {in., mm}: Water loss that becomes unavailable for reuse through evaporation, phreatophytic transpiration, or groundwater recharge that is not economically recoverable. (NRCS)

irrigable area {acres, ha}: Area capable of being irrigated, principally based on availability of water, suitable soils, and topography of land. (NRCS)

irrigation: Intentional application of water for purposes of sustained plant growth and/or optimized production.

irrigation audit: Procedure to collect and present information concerning the uniformity of application, precipitation rate, and general condition of an irrigation system and its components.

irrigation consumptive use coefficient [ICUC]: See **coefficient**.

irrigation design: Plan of an irrigation system with pipe sizing, head layout and valve location. (Masdon, Water Management Committee, 2001)

irrigation district: Cooperative, self-governing, semipublic organization set up as a subdivision of a state or local government to provide irrigation water. (NRCS)

irrigation efficiency: See **efficiency**.

irrigation frequency {-/week}: Measure of the number of irrigations per unit time.

irrigation:

- **gross** [I_{gross}] {in., mm}: Water actually applied, which may or may not be total irrigation water requirement; i.e., leaving storage in the soil for anticipated rainfall, harvest. (NRCS)
- **net** [I_{net}] {in., mm}: Actual amount of applied irrigation water stored in the soil for plant use or moved through the soil for leaching salts. Also includes water applied for crop quality and temperature modification; i.e., frost control, cooling plant foliage and fruit. Application losses, such as evaporation, runoff, and deep percolation are not included. (NRCS) See *also* **irrigation requirement, net**.

irrigation interval [IN] {h, days}:

- Average time interval between the commencement of successive irrigations for a given field (or area). (ASAE, 1998)
- Time between irrigation events. Usually considered the maximum allowable time between irrigations during the peak ET period. (NRCS)

irrigation period {h}: Time that it takes to apply one irrigation to a given design area during the peak consumptive-use period of the crop being irrigated. (Soil, 2013)

irrigation (water) requirement:

- **net irrigation requirement** [IR_{net}] {in., mm}: Depth of water, exclusive of effective precipitation, stored soil moisture, or ground water that is required for meeting crop evapotranspiration for crop production and other related uses. Such uses may include water required for leaching, frost protection, cooling and chemigation. (NRCS)
- **gross irrigation requirement** [IR_{gross}] {in., mm}:
 - Total amount of water applied (or desired). See *also* **irrigation water requirement**.
 - Total irrigation requirement including net crop requirement plus any losses incurred in distributing and applying and in operating the system. (NRCS)
- **irrigation water requirement** [IWR] {in., mm}: Calculated amount of water needed to replace soil water used by the crop (soil water deficit), for leaching undesirable elements through and below the plant root zone, plus other needs; after considerations are made for effective precipitation. (NRCS)

irrigation sagacity [IS] {%}: Ratio of volume of irrigation water beneficially or reasonably used to the total volume of irrigation water that has left the region, both in a specified period of time. (Burt et al., 1997)

irrigation schedule:

- Procedure of establishing and implementing the time and amount of irrigation water to apply.
- Determining when to irrigate and how much water to apply, based upon measurements or estimates of soil moisture or crop water used by a plant. (NRCS)
- Set of specifications identifying times to turn on and off water to various zones of an irrigation system.

irrigation scheduling: See **scheduling**.

irrigation set {acres, ha}: Area irrigated at one time within a field. (Soil, 2013)

irrigation set time: See **set time**.

irrigation slope {%, ft/100 ft, m/100m}: Elevation difference along the direction of irrigation. Sometimes called irrigation grade. (NRCS)

irrigation system:

- Physical components (pumps, pipelines, valves, nozzles, ditches, gates, siphon tubes, turnout structures) and management used to apply irrigation water by an irrigation method. (NRCS)
- All equipment required to convey water to or within the design area. (ANSI/ASAE S376.2, 1998)
- **drip/trickle/micro**: Microirrigation system (low pressure and low volume) wherein water is applied to the soil surface (or below the soil surface) as drops or small streams through emitters. Discharge rates are generally less than 2 gph for single-outlet emitters and 3 gph per meter for line source emitters. Preferred term is **drip irrigation**. (NRCS and ASAE, 1998)
- **bubbler irrigation**: Application of water to flood the soil surface using a small stream or fountain. The discharge rates for point source bubbler emitters are greater than for drip or subsurface emitters but generally less than 1 gpm. A small basin is usually required to contain or control the water. (ASAE, 1998)
- **surface**:
 - Type of irrigation where water is distributed to the plant material by a ground surface distribution network possibly including rows or dikes.
 - Broad class of irrigation methods in which water is distributed over the soil surface by gravity flow. (ASAE, 1998)
- **basin irrigation**: Irrigation by flooding areas of level land surrounded by dikes. Used interchangeably with level border irrigation but usually refers to smaller areas. (ASAE, 1998)
- **border irrigation**: Irrigation by flooding strips of land, rectangular in shape and cross-leveled, bordered by dikes. Water is applied at a rate sufficient to move it down the strip in a uniform sheet. Border strips having no downfield slope are referred to as level border systems. Border systems constructed on terraced lands are commonly referred to as benched borders. (ASAE, 1998)
- **cablegation**: Method of surface irrigation that uses gated pipe to both transmit and distribute water to furrows or border strips. A plug, moving at a controlled rate through the pipe, causes irrigation to progress along the field and causes flow rates from any one gate to decrease continuously from some maximum rate to zero. (ASAE, 1998)

- **check irrigation:** Modification of a border strip with small earth ridges or checks constructed at intervals to retain water as the water flows down the strip. (ASAE, 1998)
- **check basin irrigation:** Water is applied rapidly to relatively level plots surrounded by levees. The basin is a small check. (Soil, 2013)
- **corrugation irrigation:** Method of surface irrigation similar to furrow irrigation, in which small channels, called corrugations, are used to guide water across a field. No attempt is made to confine the water entirely to the corrugations. (ASAE, 1998)
- **flood irrigation:** Method of irrigation where water is applied to the soil surface without flow controls, such as furrows, borders or corrugations. (ASAE, 1998)
- **furrow irrigation:** Method of surface irrigation where the water is supplied to small ditches or furrows for guiding across the field. (ASAE, 1998)
 - **alternate set irrigation:** Method of managing irrigation whereby, at every other irrigation, alternate furrows are irrigated, or sprinklers are placed midway between their locations during the previous irrigation. (ASAE, 1998)
 - **alternate side irrigation:** Practice of furrow irrigating one side of a crop row (for row crops or orchards) and then, at about half the irrigation time, irrigating the other side.
 - **cutback irrigation:** Reduction of the furrow or border inflow stream after water has advanced partially or completely through the field in order to reduce runoff. (ASAE, 1998)
 - **surge:** Surface irrigation technique wherein flow is applied to furrows (or less commonly, borders) intermittently during a single irrigation set. (ASAE, 1998)
- **wild flooding:** Surface irrigation system where water is applied to the soil surface without flow controls, such as furrows, borders (including dikes), or corrugations. (NRCS)
- **sprinkler:** Type of irrigation using mechanical devices with nozzles (sprinklers) to distribute the water by converting water pressure to a high velocity discharge stream or streams.
 - **continuous/self-move system:** Lateral, sprinkler (traveler), or boom that is continuous or self moving while water is being applied. Power for moving the facility is typically provide by electric or hydraulic (water) motors or small diesel engines. (NRCS)
 - **boom:** Elevated, cantilevered boom with sprinklers mounted on a central stand. The sprinkler-nozzle trajectory back pressure rotates the boom about a central pivot which is towed across the field by a cable attached to a winch or tractor. Can also be a periodic-move system. (NRCS)
 - **center pivot:** Automated irrigation system consisting of a sprinkler lateral rotating about a pivot point and supported by a number of self-propelled towers. Water is supplied at the pivot point and flows outward through the pipeline supplying the individual sprinklers or spray heads. (NRCS)
 - **corner pivot:** Additional span or other equipment attached to the end of a center pivot irrigation system that allows the overall radius to increase or decrease in relation to field boundaries. (NRCS)
 - **lateral (linear) move:** Automated irrigation machine consisting of a sprinkler line supported by a number of self-propelled towers. The entire unit moves in a generally straight path perpendicular to the lateral and irrigates a basically rectangular area. (NRCS)
 - **traveler (traveling gun) irrigation:** Large rotating sprinkler(s) mounted on a trailer to deliver water in a circle. The sprinkler and associated trailer are towed through the field by any of several means. ... Travelers are also called **cable-tow**, **hard hose** and **hose drag**. (NRCS)
- **periodic-move system:** System of laterals, sprinklers heads (gun types), or booms that are moved between irrigation settings. They remain stationary while applying water. (NRCS)
 - **gun type:** Single sprinkler head with large diameter nozzles, supported on skids or wheels. Periodically moved by hand or mechanically with a tractor, cable, or water supple hose. ... (NRCS)
 - **portable (hand move) irrigation:** Sprinkler system which is moved by uncoupling and picking up the pipes manually, requiring no special tools. (Soil, 2013)
 - **side move:** Sprinkler system with the supply pipe supported on carriages and towing small diameter trailing pipelines each fitted with several sprinkler heads. (NRCS)
 - **side role (wheel line):** Supply pipe is usually mounted on wheels with the pipe as the axle and where the system is moved across the field by rotating the pipeline by engine power. (NRCS)

- **towed sprinkler**: System where lateral lines are mounted on wheels, sleds, or skids and are pulled or towed in a direction approximately parallel to the lateral. Rollers or wheels are secured in the ground near the main water supply line to force an offset in the tow path equal to half the distance the lateral would have been moved by hand. (NRCS)
- **solid set/fixe**d: System that covers the complete field with pipes and sprinklers in such a manner that all of the field can be irrigated without moving any of the system. (NRCS)

irrigation water requirement: See **irrigation requirement**.

isolation valve: See **valve**.

J

jockey pump: See **pump**.

K

kinematic viscosity [ν] {ft²/s, m²/s}: Measure of the resistance of a liquid to shear forces.

L

lag time (flood irrigation) {h, min}: Period between the time that the irrigation stream is turned off at the upper end of an irrigated area and the time that water disappears from the surface at the point or points of application. (Soil, 2013)

landscape coefficient: See **coefficient**.

lateral:

- Secondary or side channel, ditch or conduit. Also call branch drain or spur.
- Water delivery pipeline that supplies irrigation water from the main line to sprinklers or emitters. (ASAE, 1998)

lateral friction factor: See **friction factor**.

lath box: Wooden box that is placed in a ditch bank to transfer water from an irrigation ditch to the field to be irrigated. Preferred term is **spile**. (ASAE, 1998)

leaching: Removal of soluble material from soil or other permeable material by the passage of water through it. (ASAE, 1998)

leaching fraction [LF]: Ratio of the depth of subsurface drainage water (deep percolation) to the depth of infiltrated irrigation water. See also **leaching requirement**. (ASAE, 1998)

leaching requirement [LR] {in., mm}: Quantity of irrigation water required for transporting salts through the soil profile to maintain a favorable salt balance in the root zone for plant development. (ASAE, 1998)

length [L, s] {ft, mm}: Linear dimension used to describe the quantity/amount/distance of pipe, conductor or similar material in various equations.

length of run {ft, mm}: Distance water must flow in furrows or borders over the surface of a field from the head to the end of the field. (ASAE, 1998)

LEPA: Acronym for **low energy precision application**.

limited irrigation: Management of irrigation applications to apply less than enough water to satisfy the soil water deficiency in the entire root zone. Sometimes called deficit or stress irrigation. (ASAE, 1998)

line source: Continuous source of water emitted along a line. (ASAE, 1998)

line source emitter: See **emitter**.

loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

loamy sand: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

long path emitter: See **emitter**.

LPIC: Acronym for **low pressure in canopy**.

looped circuit: Piping system, usually a main line, that closes back on itself in a loop, thus providing water to any location from two routes.

low energy precision application [LEPA]: A water, soil, and plant management regime where precision down-in-crop applications of water are made on the soil surface at the point of use. Application devices are located in the crop canopy on drop tubes mounted on low pressure center pivot and linear move sprinkler irrigation systems. ... (NRCS)

low pressure in canopy [LPIC]: System that may or may not include a complete water, soil and plant management regime as required in LEPA. Application devices are located in the crop canopy with drop tubes mounted on low-pressure center pivot and linear move sprinkler irrigation systems. ... (NRCS)

low head drainage: Condition in which water drains partially or completely out of the lateral line through the sprinkler head after each irrigation cycle is completed. (Keesen, 1995)

lower quarter distribution uniformity: See **distribution uniformity**.

lysimeter:

- Device for measuring deep percolation from a soil profile, usually consisting of an enclosed volume of undisturbed soil with some means of collecting drainage water. It may also include some method of measuring changes in the volume of stored soil water. (Hess, 1999)
- Isolated block of soil, usually undisturbed and in situ, for measuring the quantity, quality, or rate of water movement through or from the soil. (NRCS)
- Device and monitoring system used to measure the evapotranspiration [ET] rate using a container closed at the bottom and with the top flush with surrounding grade and planted with turf. After rainfall and irrigation application are accounted for, daily change in the weight of the lysimeter is directly related to ET. (Smith, 1997)

M

main (main line): Water delivery pipelines that supply water from the control station to the manifolds. (ASAE EP405.1, 1999)

management allowable (allowed) depletion (deficit) [MAD] {%, -}:

- See similar term **maximum allowable deficiency**.
- Desired soil moisture deficit at the time of irrigation. (On-farm Committee, 1979)
- Portion of **available water** that is scheduled to be used prior to the next irrigation.

manipulated soils: See **disturbed soils**.

manufacturer's coefficient of variation [C_v]: Measure of the variability of discharge of a random sample of a given make, model, and size of microirrigation emitter, as produced by the manufacturer and before any field operation or aging has taken place; equal to the ratio of the standard deviation of the discharge of the emitters to the mean discharge of the emitters. (ASAE, 1998)

manifold:

- Pipeline that supplies water to the laterals. (ASAE, 1998)
- Closely linked series of mainline piping supplying water to valves or laterals.

master valve: See **valve**.

matched precipitation rate: System or zone in which all the heads have similar precipitation rates is said to have matched precipitation rates. (Monroe, 1993)

matric potential {ft, m}: Dynamic soil property and will be near zero for a saturated soil. Matric potential results from capillary and adsorption forces. This potential was formerly called capillary potential or capillary water. (NRCS)

maximum allowable deficiency [MAD_p]:

- See similar term **management allowed depletion**.
- Term used to estimate the amount of water that can be used without adversely affecting the plant and is defined as the ratio of readily available water to available water. (James, 1988).

maximum application rate {in./h, mm/h}: Maximum discharge at which sprinklers can apply water without causing significant translocation. (NRCS)

median drop size {in., mm}: Diameter where half the sprinkler's water volume falls in drops smaller and half falls in drops larger than the median size. (Solomon et al., 1996)

microclimate: Atmospheric conditions within or near a crop canopy. (NRCS, 1997)

microclimate factor: See **coefficient**.

microirrigation: See **irrigation system**.

MIPT: Acronym for male iron pipe thread. (Smith, 1997)

mist irrigation: Method of microirrigation in which water is applied in very small droplets. (ASAE, 1998)

mixed flow pump: See **pump**.

moisture deficit, soil moisture depletion {in., mm}: Difference between actual soil moisture and soil moisture held in the soil at field capacity. (NRCS)

moisture sensor (meter): Device that monitors or measures soil water content or tension.

MPT {in., mm}: Acronym for male nominal pipe threads.

multistage pump: See **pump**.

N

net irrigation: See **irrigation, net**

net irrigation requirement [NIR] {in., mm}: See **irrigation (water) requirement, net irrigation requirement**.

net positive suction head [NPSH] {ft, m}: Head that causes liquid to flow through the suction piping and enter the eye of the pump impeller.

net positive suction head available [NPSHA] {ft, m}: Pressure head that is supplied (is available) to the eye of an impeller in a pump based on system characteristics. (*Principles of Irrigation*, 2012)

net positive suction head required [NPSHR] {ft, m}: Minimum pressure head required at the eye of an impeller in a pump to prevent cavitation. (*Principles of Irrigation*, 2012)

net precipitation rate: See **precipitation rate**.

nominal {in., m}: Named size which is usually not the actual dimensions of the product, i.e., a ½-inch schedule 40 pipe is not a ½-inch ID or OD.

nonbeneficial use: See **use**.

nonconsumptive use: See **use**.

non-point source pollution: Pollution originating from diffuse areas (land surface or atmosphere) having no well-defined source. (NRCS)

non-saline sodic soil: Soil containing soluble salts that provide an electrical conductivity of saturation extract (ECe) less than 4.0 mmhos/cm and an exchangeable sodium percentage [ESP] greater than 15. Commonly called black alkali or slick spots. (NRCS)

nozzle: Final orifice through which water passes from the sprinkler or emitter to the atmosphere. (Rain Bird, 1997)

number of outlets [N_o]: Term used to describe the number of outlets in a lateral.

O

operating pressure {psi, kPa}: Actual head pressure remaining at the emission device after the total pressure loss from the point of connection or water source to the critical emission device is subtracted from the starting static pressure. (Texas Natural Resource Conservation Commission)

opportunity time {min., h}: Time that water inundates the soil surface with opportunity to infiltrate. (NRCS)

orchard valve: See **valve**.

orifice: Opening with a closed perimeter through which water flows. Certain shapes of orifices are calibrated for use in measuring flow rates. (ASAE, 1998)

osmotic potential {ft, m}: Potential attributable to the presence of solutes in the soil; in other words, to the soil solution. (Brady, 1990)

osmotic pressure (potential) {psi, ft, kPa, m}: See **potential**.

oven dry: Drying of soil samples in an oven for a sufficient period of time to reach a constant weight. (Black, 1965)

overhead irrigation: Same as **sprinkler irrigation**.

P

pan coefficient: See **coefficient, pan**.

peak use rate {in./day, in./week}: Maximum rate at which a crop uses water. (NRCS)

percentage fines {%}: Percentage of water volume falling in fine (< 1 mm in diameter) drops. Term also used relative to soil particle size.

percolation {in.}:

- **beneficial deep percolation leaching**: A beneficial use when it leaches salts from the root zone to a level required for acceptable crop production. (Burt et al., 1997)
- **nonbeneficial (excess) deep percolation**: If the actual depth of deep percolation at a given location is more than the required beneficial leaching depth, that which is in excess of the requirement is nonbeneficial. (Burt et al., 1997)

percolation rate {in./h, mm/h}: Rate at which water moves through porous media, such as soil. (ASAE, 1998)

performance curve: Graph showing the capability of a product with varying inputs (i.e., the dynamic head of a pump as it varies with discharge).

permanent irrigation: Irrigation having underground piping with risers and sprinklers. Preferred term is **stationary sprinklers**. (Soil, 2013)

(permanent) wilting point [PWP] {%, in./in., in./ft, mm/m}:

- Moisture content, on a dry weight basis, at which plants can no longer obtain sufficient moisture from the soil to satisfy water requirements. Plants will not fully recover when water is added to the crop root zone once permanent wilting point has been experienced. Classically, 15 atmospheres (15 bars), soil moisture tension is used to estimate PWP. (NRCS)
- Moisture content of the soil after the plant can no longer extract moisture at a sufficient rate for wilted leaves to recover overnight or when placed in a saturated environment. (On-farm Committee, 1978)

permeability {in./h, mm/h}:

- Qualitatively, the ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil. (NRCS)
- Quantitatively, the specific soil property designating the rate at which gases and liquids can flow through the soil or porous media. (NRCS)

pesticide: Chemical agent used to control specific organisms. Includes insecticides, herbicides, and fungicides. (NRCS)

pipe dope: Common name for commercial products used to apply to pipe fittings to assist in the appropriate fit of the threaded joints.

pitot tube: Small ell-shaped tube which can be attached to a pressure gauge or other measuring device to measure the velocity head of water discharging from a nozzle or flowing in a pipe.

pH: Measure of acidity or alkalinity. (Burt, 1998)

plant available water [PAW] {in., mm}: Available water located in the root zone. Same as **root zone available water**.

plant water requirement [PWR] {in./day, in./week, mm/day}: Same as **evapotranspiration**.

point of connection [POC]: Location where irrigation system is connected to a (potable) water supply.

polyethylene [PE]: Flexible (usually black) plastic material used to make irrigation pipe and other items.

polyvinyl chloride [PVC]: Semi-rigid plastic material used to make irrigation pipe and other items.

porosity {%,-}: Volume of pores in a soil sample relative to the total volume of the sample. (Hess, 1999)

portable (hand move) irrigation: See **irrigation system**.

positive displacement pump: Pump that moves a fixed quantity of fluid with each stroke or rotation, such as a piston or gear pump. (ASAE, 1998)

potable water:

- Domestic or drinking water. It can be used as a source of irrigation water, but once water enters an irrigation system (and passes through the backflow device) it is no longer considered potable.
- Treated water which is meant for human consumption. It can be used for irrigation systems as long as protection is provided to prevent contamination of the domestic supply. (Texas Natural Resource Conservation Commission)

potential:

- **soil water potential** {ft, bar, kPa}: Amount of work that must be done per unit quantity of pure water in order to transport reversibly and isothermally an infinitesimal quantity of water from a pool of pure water at a specified elevation at atmospheric pressure to the soil water at the point under consideration. (ASAE, 1998)
- **total potential** [Ψ_t] {ft, bar, kPa}: Sum of matric, pressure, solute and gravitational potentials. (Burt, 1998)
- **matric potential** [Ψ_m] {ft, bar, kPa}: Attraction of the solid soil matrix for water. (Burt, 1998)
- **pressure potential** [Ψ_p] {ft, bar, kPa}: Potential caused by water pressure. (Burt, 1998)
- **solute or osmotic potential** [Ψ_s] {ft, bar, kPa}: Potential caused by salinity. (Burt, 1998)
- **gravitational potential** [Ψ_z] {ft, bar, kPa}: Relative height of a point above or below a reference elevation. (Burt, 1998)

potential evapotranspiration: See **evapotranspiration**.

power [P] {kw, hp}: Rate of doing work. See also **horsepower**. (Derryberry, 2007)

precipitation {in., mm}: Total of all atmospheric water deposited on the surface (i.e., rain, snow, hail, dew and condensation). (Hess, 1999)

precipitation rate [PR] {in./h, mm/h}: Rate at which a sprinkler system applies water to a given area. (NRCS, 1997)

- **instantaneous precipitation (application) rate** {in./h, mm/h}: Maximum rate, usually localized, that a sprinkler application device applies water to the soil. (NRCS)
- **net precipitation rate** [PR_{net}] {in./h, mm/h}: Amount of water that actually reaches the landscape. The net precipitation rate is the gross precipitation rate minus the losses that occur between the sprinkler and the landscape surface. (*Landscape Irrigation Auditor, 2nd Edition, 2010*)
- **sprinkler precipitation rate** {in./h, mm/h}: Precipitation rate of a group of heads used together and all having the same arc, spacing and flow. (Monroe, 1993)
- **system precipitation rate** [PR] {in./h, mm/h}: Precipitation rate for a system is the average precipitation rate of all sprinklers in a given area regardless of the arc, spacing, or flow rate of each head. (Monroe, 1993)

pressure [P, p] {psi, lb/in.², kPa}: The force exerted over a surface divided by its area (Webster). In irrigation, pressure usually describes the amount of energy available to move water through a pipe, sprinkler or emitter.

pressure due to surge [p_s] {psi, kPa}: Water pressure caused due to changes in water velocity in a pipe system. Also referred to as **surge pressure**.

pressure, dynamic {psi, kPa}: The pressure when water is flowing past the delivery point. (*Irrigation, Sixth Edition*, 2011)

pressure loss {psi, kPa, m}: Amount of pressure lost as water flows through a system. (Rain Bird, 1997)

pressure rating [PR] {psi, kPa, m}: Estimated maximum internal pressure that can be continuously exerted in a pipe or container with a high degree of certainty that it will not fail. (ASAE, 1998 and ANSI/ASAE S376.2, 1998)

pressure-regulating valve: A valve that regulates pressure to a set value immediately downstream from the valve. (*Irrigation, 2nd Edition*, 1959)

pressure tank: Enclosed container attached to a water system usually containing an air pocket so that it behaves as a temporary water supply.

pressure vacuum breaker: See **backflow prevention device**.

profile (soil): Vertical section of the soil through all its horizons and extending into the C horizon. (Soil, 2013)

profile (sprinkler): Chart showing the application rates vs. distance of throw for a sprinkler head. See also **single leg profile**. (Center for Irrigation Technology, SpacePro Glossary).

program: See **scheduling program**.

project efficiency: See **efficiency**.

propeller pump: Pump which develops most of its head by the lifting action of vanes on the water. (ASAE, 1998)

psi: Acronym for pounds per square inch. See **pressure**.

pump: A pump is simply a machine that transforms mechanical energy into pressure and velocity energy in flowing water. (*Irrigation, Sixth Edition*, 2011)

- **auxiliary**: Any pump designed to perform a service to the main pump or power unit, such as a cooling water pump or a standby pump to supplement the system for peaking requirements. (ASAE, 2007)
- **axial flow**: A rotary pump that develops head mostly by the propelling or lifting action of the vanes on water, commonly referred to as a propeller pump. (ASAE, 2007)
- **centrifugal**: Pump consisting of rotating vanes (impeller) enclosed in a housing and used to impart energy to a fluid through centrifugal force. (ASAE, 2007)
- **jockey**: Usually a small pump used to provide pressure and flow in a multi-pump system.
- **mixed flow**: Centrifugal pump in which the pressure is developed partly by centrifugal force and partly by the lifting action of the impellers on the water. (ASAE, 2007)
- **multi-stage**: Pump having more than one impeller mounted on a single shaft. (NRCS)
- **radial flow**: Centrifugal pump that uses diffuser vanes to transform the velocity head into pressure head. Commonly called a "turbine pump." (ASAE, 1998)
- **submersible**: Pump where the motor and pump are submersed below the water surface.
- **trash**: Pump designed to pump large-sized particulate matter in addition to liquid.
- **PTO (power take-off)**: Pump driven by a separate power supply connected to the pump by a power take-off [PTO] drive.
- **vertical turbine**: Pump having one or more stages, each consisting of an impeller on a vertical shaft, surrounded by stationary and usually symmetrical guide vanes. Combines the energy-imparting characteristics of axial-flow and propeller pumps. (ASAE, 1998)

pump column: Pipe through which water from well pumps (vertical turbine impellers) is conveyed to the ground surface (pump discharge head). (ASAE, 1998)

pump efficiency: See **efficiency**.

pump start circuit: Feature on automatic controllers that supplies 24 VAC, which can be used to activate a pump through an external pump start relay. (Rain Bird, 1997)

PVC: See **polyvinyl chloride**.

Q

quick-coupling valve: See **valve**.

R

radial flow pump: See **pump**.

radius of throw [R_t] {ft, m}: Distance from the sprinkler head to the furthest point of water application and is used only for heads with circular wetting patterns. (Rochester, 1995)

rain gauge: Device such as a graduated tube used to measure the amount of rainfall.

rain sensor: Device to measure rainfall.

rain shut-off device: Device that senses rainfall and shuts off or prevents activation of irrigation. (*Irrigation, Sixth Edition*, 2011)

rain switch: See **rain shut-off device**.

rainfall intensity [i] {in./h, mm/h}: A measure of the amount of rain that falls over time. (www.floodsite.net, 2013)

rational equation: Equation used to predict the runoff from a watershed.

readily available water [RAW] {in./ft, mm/m}: Portion of available water that is more readily available for plant usage. It varies with plant type. See related term **maximum allowable deficiency**.

reasonable uses: See **uses**.

reclaimed water: Water that has been collected after an original use for reuse.

rectangular spacing: See **spacing**.

reduced pressure (backflow preventer) device: See **backflow prevention device**.

reference crop evapotranspiration: See **evapotranspiration**.

relative humidity {%}: Ratio of the amount of water vapor present in the atmosphere to the amount required for saturation at the same dry bulb temperature. (NRCS)

relay: Electrical or electronic device that uses a signal current to actuate a separate electrical circuit.

resistance [R , R_w] {ohms}: Hindrance to current flow in a given circuit.

Reynolds number [R]: Dimensionless number used to characterize flow of water.

riparian:

- Area of flowing streams that lies between the normal water line and some defined high water line. (NRCS)
- Pertaining to the banks of a body of water; riparian owner is the one who owns the banks. (NRCS)
- Riparian water right is the right to use and control water by virtue of ownership of the banks. (NRCS)

riser: Length of pipe that has male nominal pipe threads on each end and is usually affixed to a lateral or submain to support a sprinkler or anti-siphon valve. (Rain Bird, 1997)

RPA: Abbreviation for **reduced pressure assembly**. See **backflow prevention devices, reduced pressure**.

root depth {in., ft, mm}: Preferred term **root zone**.

- **effective** {in., ft, mm}: Depth from which roots extract water. The effective rooting depth is generally the depth from which the crop is currently capable of extracting soil water. However, it may also be expressed as the depth from which the crop can extract water when mature or the depth from which a future crop can extract soil water. Maximum effective root depth depends on the rooting capability of the plant, soil profile characteristics, and moisture levels in the soil profile. (NRCS)

root zone [RZ, d , d_r] {in., ft, mm}: Depth of soil that plant roots readily penetrate and in which the predominant root activity occurs. (ASAE, 1998)

- Area of the soil from which the crop roots extract water and nutrients. (USDA, 1993)
- May also be used as a portion of the root zone in equations where soil characteristics change within the root zone.

root zone available water [RZAW] {in., mm}: See preferred term **plant available water**.

root zone depth: See **root zone** and **depth**.

rotational speed [N] {rpm}: Number of revolutions made per unit time (usually minutes) by a shaft or other object.

rotor sprinkler: See **sprinkler head**.

row spacing: See **spacing, row**

runoff [RO] {in., mm}:

- Portion of precipitation, snow melt or irrigation, that flows over the soil, eventually making its way to surface water supplies. (ASAE, 1998)
- Surface water that leaves the subject region in liquid form. (Burt et al., 1997)

runoff rate {in./h, mm/h}: Rate at which water flows above ground from a watershed or field

run time [RT] {minutes, h}: Length of time to operate an irrigation system or an individual zone. (*Principles of Irrigation*, 2012)

run time multiplier [RTM]: Multiplier used to compensate for the lack of perfect uniformity in a sprinkler system. See also **scheduling coefficient**. (Scheduling, 1999)

S

sail index {ft²/gal, m²/m³}: Cross-sectional area per unit volume of water of the drop comprising the sprinkler spray. (Solomon, 1996)

saline soil:

- Non-sodic soil containing soluble salts in such quantities that they interfere with the growth of most crops ... (ASAE, 1998)
- Soil that has sufficient soluble salts to interfere with crop growth. ... (Hess, 1999)
- Non-sodic soil containing sufficient soluble salts to impair its productivity for growing most crops. The electrical conductivity [ECe] of the saturation extract is greater than 4 mmhos/cm, and exchangeable sodium percentage [ESP] is less than 15; i.e., non-sodic.
- The principal ions are chloride, sulfate, small amounts of bicarbonate, and occasionally some nitrate. Sensitive plants are affected at half this salinity, and highly tolerant ones at about twice this salinity. (NRCS)

saline-sodic soil: Soil containing both sufficient soluble salts and exchangeable sodium to interfere with the growth of most crops. The exchangeable sodium percentage [ESP] is greater than or equal to 15, and electrical conductivity of the saturation extract [ECe] is greater than 4 mmhos/cm. It is difficult to leach because the clay colloids are dispersed. (NRCS)

salinity: Refers to the amount of salts dissolved in soil water.

sand: Soil separate consisting of particles ranging from 0.2 to 0.05 millimeters in equivalent diameter. See also **texture (soil)**. (NRCS Soil Survey Manual)

sandy clay: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

sandy clay loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

sandy loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

saturation (of soil) {in./in., in./ft, %, mm/m}: Condition where all soil pores/voids are filled with water. (NRCS)

schedule: Method of specifying the dimensions and thus the allowable operating pressure of pipe. For a specific schedule rating, the wall thickness remains relatively constant for different pipe diameters, resulting in lower allowable operating pressures for larger diameter pipe.

schedule, irrigation. See **irrigation schedule**.

scheduling, irrigation:

- Procedure of establishing and implementing the time and amount of irrigation water to apply.
- Determining when to irrigate and how much water to apply, based upon measurements or estimates of soil moisture or crop water used by a plant. (NRCS)

scheduling coefficient [SC]:

- A number that relates to the uniformity of coverage and how to operate the system to adequately irrigate the entire turf area. It indicates the amount of extra watering time needed to adequately irrigate the driest areas. (Solomon, 1988; Zoldoske et al., 1994)

scheduling program: Set of specifications identifying times to turn on and off water to various zones of an irrigation system.

SDR: See **standard dimension ratio**.

semiarid climate: See **climate**.

service factor: A safety factor or reserve capacity built into the design of an electric motor. (*Irrigation, Sixth Edition*, 2011)

service line: Section of piping connecting larger municipal supply line with water meter.

set time, irrigation {h, min.}:

- Elapsed time between the beginning and end of water application to an irrigation set. (ASAE, 1998)
- Amount of time required to apply a specific amount of water during one irrigation to a given area, typically refilling the plant root zone to field capacity minus expected rainfall. (NRCS)

shutoff head {ft, kPa, m}: Pressure head on the outlet side of a pump at which the discharge drops to zero. Maximum pressure a pump will develop at a given speed. (ASAE, 1998)

silt: Soil separate consisting of particles ranging from 0.05 to 0.002 millimeters in equivalent diameter. See also **texture (soil)**. (*NRCS Soil Survey Manual*)

silt loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

silty clay: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

silty clay loam: Soil textural class. See also **texture (soil)**. (*Glossary of Soil Science Terms*, 2013)

single leg profile: Precipitation rate profile of an individual sprinkler head operating at a known, constant pressure. (Oliphant, 1989)

siphon: Closed conduit used to convey water across localized minor elevation raises in grade. It generally has end sections below the middle section. A vacuum pump is commonly used to remove air and keep the siphon primed. The upstream end must be under the water surface. Both ends must be under water, or the lower end must be closed to prime the siphon. (NRCS)

siphon tube: Relative short, light-weight, curved tube used to convey water over ditch banks to irrigate furrows or borders. (ASAE, 1998)

slide gate: Head control valve, which slides on rails, used to control drainage or irrigation water. (ASAE, 1998)

sodic soil: Nonsaline soil containing sufficient exchangeable sodium to adversely affect crop production and soil structure. ... (ASAE, 1998)

sodium adsorption ratio [SAR]: Portion of soluble sodium ions in relation to the soluble calcium and magnesium ions in the soil water extract ... (ASAE, 1998)

sodium adsorption ratio, adjusted: Sodium adsorption ratio of a water adjusted for the precipitation or dissolution of Ca^{2+} and Mg^{2+} that is expected to occur where a water reacts with alkaline earth carbonates with a soil. ... (NRCS)

sodium percentage {%}: Percentage of total cations that is sodium in water or soil solution. (ASAE, 1998)

soil: Unconsolidated minerals and material on the immediate surface of the earth that serve as a natural medium for the growth of plants. (ASAE, 1998)

soil horizon:

- Layer of soil differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics. (ASAE, 1998)
- Layer of soil, usually approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes. (Hess, 1999)

soil moisture (water) depletion (deficit) [SMD] {in., mm}:

- Difference between field capacity and the actual soil moisture in the root zone soil at any given time. It is the amount of water required to bring the soil in the root zone to field capacity. (On-farm Committee, 1979)
- Amount of water required to fill the plant root zone to field capacity. (Burt, 1998)

soil profile:

- Vertical section of the soil from the surface through all its horizons into the parent material. (ASAE, 1998)
- A vertical cross section through a soil that shows any layers or horizons of which the soil is composed. (Hess, 1999)

soil reservoir capacity [SRC] {in., mm}: Preferred term **plant available water**.

soil series: Lowest category of U.S. system of soil taxonomy. A conceptualized class of soil bodies having similar characteristics and arrangement in the soil profile. (ASAE, 1998)

soil structure: See **structure**.

soil texture: See **texture**.

soil water (moisture) {in., mm}: All water stored in the soil. (ASAE, 1998)

soil water characteristic curve: Soil-specific relationship between the soil-water matric potential and soil-water content. (ASAE, 1998)

soil water content [WC%, θ] {%, in./ft, in./in., mm/m}: Amount of water in a given volume (or weight) of soil. ... (NRCS)

soil-water (moisture) deficit or depletion [SWD] {in., mm}:

- Depth of water required to bring a specific depth of soil to field capacity at a particular time. (ASAE, 1998)
- Preferred term **soil moisture depletion**.

soil-water potential: See **potential**.

soil-water tension: {bars, atm., kPa}: Measure of the tenacity with which water is retained in the soil. It is the force per unit area that must be exerted to remove water from the soil. ... (NRCS)

solenoid: A coil of wire that acts as an electromagnet when electric current is passed through it, often used to control the motion of metal objects, such as a switch or relay. Used in irrigation as a component of remote control valves. (thefreedictionary.com)

solid set irrigation system: See **irrigation system**.

spacing {ft, m}:

- **between sprinklers** [S_s , S]: Distance from one sprinkler to the next one along a row.
- **between rows (of sprinklers)** [S_r]: Distance between adjacent rows of sprinklers.
- **between drains** [S_d]: Distance between parallel subsurface drain lines.
- **equilateral triangular spacing** [S]: Sprinklers are spaced in an equilateral triangular pattern.
- **rectangular spacing**: Sprinklers are spaced in a rectangular pattern.
- **row spacing**: Distance between the rows of sprinklers. See **spacing between rows**. (Monroe, 1993)
- **head-to-head spacing** [S]: Sprinklers are spaced so that each head throws water to the adjacent heads.
- **triangular spacing** [S]: Sprinklers are spaced in a triangular pattern.

species factor: See **coefficient**.

specific gravity [SP. GR.]: Ratio of a substance's density (or specific weight) to that of some standard substance such as water. For liquids, the standard is water at sea level and 60 degrees Fahrenheit (SP. GR. = 1).

specific speed [N_s] {rpm}: Index of pump type related to impeller speed, discharge and total head. (ASAE, 1998)

specific volume [v_s] {ft³/lb, m³/kg}: Volume occupied by a unit mass of fluid.

specific weight [SW] {lb/ft³, kg/m³}: Weight per unit volume of a substance.

spile: Conduit, made of lath, pipe or hose, placed through ditch banks to transfer water from an irrigation ditch to a field. (ASAE, 1998)

spray head: See **sprinkler head**.

spray irrigation:

- Application of water by a small spray or mist to the soil surface, where travel through the air becomes instrumental in the distribution of water. (ASAE, 1998)
- In some countries other than the United States, sprinkler irrigation is called spray irrigation.

sprinkler distribution pattern:

- Water depth-distance relationship measured from a single sprinkler head. (NRCS)
- Two-dimensional water depth-distance relationship measured from a single (or multiple) sprinkler head(s).

sprinkler (head): Nozzle or device, which may or may not rotate, for distributing water under pressure through the air. (NRCS and ASAE, 1998)

- **gear drive sprinkler**: Sprinkler containing gears as part of its rotational drive mechanism.
- **impact drive**: Sprinkler that rotates using a weighted or spring-loaded arm that is propelled by the water stream and hits the sprinkler body, causing movement. (Rain Bird, 1997)
- **rotor**: Sprinkler that rotates, but may more specifically refer to a gear-driven sprinkler.
- **spray head**: Sprinkler head that does not rotate.
- **valve-in-head**: Sprinkler head having an integrally mounted valve.

sprinkler irrigation: Method of irrigation in which the water is sprayed, or sprinkled, through the air to the ground surface. (ASAE, 1998)

sprinkler irrigation system: See **irrigation system**.

sprinkler precipitation rate: See **precipitation rate**.

sprinkler profile: See **profile (sprinkler)**

standard deviation [SD] {same as units of variable}: Statistical term used to describe the distribution of values.

standard dimension ratio [SDR]: Dimension ratio is defined as the ratio of the diameter of a pipe to its wall thickness. Outside diameter is used for OD-rated pipe while inside diameter is used for ID-rated pipe. Certain dimension ratios have been selected by convention and standards to be used for construction of pipe. These dimension ratios are referred to as standard dimension ratios. (ASAE, 1985)

static discharge head: See **head**.

static head: See **head**.

static lift {ft, m}: Vertical distance between water source and discharge water levels in a pump installation. Same as **total static head**. (ASAE, 1998)

static pressure {psi, kPa}: Static pressure is pressure with no water flowing. See also **head**. (*Irrigation, Sixth Edition*, 2011)

static suction head: See **head**.

static suction lift: See **suction lift**.

station: Circuit on a controller that has the ability to be programmed with a run time unique and separate from other circuits and provides power to one or more remote control valves (or valve-in-head sprinklers). (Rain Bird, 1997)

stationary sprinklers: Irrigation having underground piping with risers and sprinklers.

stress irrigation: Management of irrigation water to apply less than enough water to satisfy the soil water deficiency in the entire root zone. Preferred term is **limited irrigation** or **deficit irrigation**. (ASAE, 1998)

structure (soil): Combination or arrangement of primary soil particles into secondary units or peds. The secondary units are characterized on the basis of size, shape, and grade (degree of distinctness). (Soil, 2013)

subhumid climate: See **climate**.

subirrigation:

- Application of irrigation water below the ground surface by raising the water table to within or near the root zone. (ASAE, 1998)
- Applying irrigation water below the ground surface either by raising the water table or by using a buried perforated or porous pipe system that discharges water directly into the plant root zone. ... (NRCS)

submersible pump: See **pump**.

subsurface drip irrigation: Application of water below the soil surface through emitters, with discharge rates generally in the same range as drip irrigation. The method of water application is different from and not to be confused with subirrigation where the root zone is irrigated by water table control. (ASAE, 1998)

suction (static) lift {ft, m}: Vertical distance between the elevation of the surface of the water source and the center of the pump impeller. (ASAE, 1998)

surface irrigation: See **irrigation systems**.

surge irrigation: See **irrigation systems**.

surge pressure [p_s] {psi, kPa}: Water pressure caused by changes in water velocity in a pipe system.

swing check (valve): See **valve**.

swing joint: Threaded connection of pipe and fittings between the pipe and sprinkler, which allows movement to be taken up in the threads rather than as a sheer force on the pipe. Also used to raise or lower sprinklers to a final grade without plumbing changes. (Rain Bird, 1997 and *Irrigation, Sixth Edition*, 2011)

system capacity, gross irrigation: {gpm/ac, gpm, m³/ha}: Ability of an irrigation system to deliver the net required rate and volume of water necessary to meet crop water needs plus any losses during the application process. Crop water needs can include soil moisture storage for later plant use, leaching of toxic elements from the soil, air temperature modification, crop quality, and other plant needs. (NRCS)

system precipitation rate: See **precipitation rate**.

T

tailwater:

- Water in a stream or canal, immediately downstream from a structure.
- Excess irrigation water that reaches the lower end of a field. (ASAE, 1998)

tensiometer: Instrument, consisting of a porous cup filled with water and connected to a manometer or vacuum gauge, used for measuring the soil-water matric potential. (ASAE, 1998)

textural class:

- Classification used to convey an idea of the textural makeup of soils and to give an indication of their physical properties. Three broad groups of these classes are recognized: sands, loams, and clays. Within each group, specified textural class names have been devised (i.e., loamy sand). (Brady, 1990)

texture (soil): Soil texture refers to the weight proportion of the separates (sand, silt and clay) in a given soil for particles less than 2 millimeters. The soil textural classes are defined below. (*NRCS Soil Survey Manual*)

- **clay:** 40 percent or more clay, 45 percent or less sand, and less than 40 percent silt.
- **clay loam:** 27 to 40 percent clay and more than 20 to 46 percent sand.
- **loam:** 7 to 27 percent clay, 28 to 50 percent silt, and 52 percent or less sand.
- **loamy sand:** Between 70 and 91 percent sand and the percentage of silt plus 1.5 times the percentage of clay is 15 or more; and the percentage of silt plus twice the percentage of clay is less than 30.
- **sand:** More than 85 percent sand, the percentage of silt plus 1.5 times the percentage of clay is less than 15.
- **sandy clay:** 35 percent or more clay and 45 percent or more sand.
- **sandy clay loam:** 20 to 35 percent clay, less than 28 percent silt, and more than 45 percent sand.
- **sandy loam:** 7 to 20 percent clay, more than 52 percent sand, and the percentage of silt plus twice the percentage of clay is 30 or more; or less than 7 percent clay, less than 50 percent silt, and more than 43 percent sand.
- **silt:** 80 percent or more silt and less than 12 percent clay.
- **silt loam:** 50 percent or more silt and 12 to 27 percent clay, or 50 to 80 percent silt and less than 12 percent clay.
- **silty clay:** 40 percent or more clay and 40 percent or more silt.
- **silty clay loam:** 27 to 40 percent clay and 20 percent or less sand.

thrust block: Normally, concrete poured in place at changes in direction of water flow in piping systems (tees, ells ...) to prevent movement of the pipe.

tilth: Physical condition of soil as related to its ease of tillage, fitness as a seedbed, and its impedance to seedling emergence and root penetration (Soil, 2013)

time [t] {s, min, h, day, fraction}: Term used to describe the duration of an operation (e.g., an irrigation event).

total dissolved solids [TDS] {ppm, mg/L}: Total dissolved mineral constituents of water. (NRCS)

total dynamic head: See **head**.

total static head: See **static lift**.

total suction head: See **head**.

total water holding capacity [TWHC] {in., mm}: Preferred term is **plant available water**.

trajectory {degrees}: Angle above horizontal of the stream of water as it leaves the sprinkler head. (Rochester, 1995)

translocation: Movement of water to other areas than where it was applied. (NRCS)

transpiration [T] {in./day, mm/day}:

- Process of plant water uptake and use, beginning with absorption through the roots and ending with transpiration at the leaf surfaces. See *also* **evapotranspiration**. (NRCS)
- Liquid movement of water from the soil, into the roots, up the plant stems, and finally out of the plant leaves into the air as vapor. (Burt, 1998)

traveler (traveling gun) irrigation: See **irrigation system**.

triangular spacing: See **spacing**.

trickle irrigation: See **irrigation system**.

turbine pump: See **pump, vertical turbine**.

turbulent flow: Flow in which the fluid particles move in an irregular random manner, in which the head loss is approximately proportional to the second power of velocity. (ASAE, 1998)

turgid: State of a plant cell when the cell wall is rigid due to the hydrostatic pressure of liquid in the cell. (Hess, 1999)

unavailable soil water {in./ft, mm/m}: Portion of water in a soil held so tightly by adhesion and other soil forces that it cannot be absorbed by plants rapidly enough to sustain growth. ... (ASAE, 1998)

uniformity: Uniformity is the measurement of how evenly water is applied to the soil.

uniformity coefficient:

- **irrigation** {-,%}: Characteristic of the areal distribution of water in a field as the result of an irrigation.
- **soil:** Ratio of the D60 size particles passing a screen to the D10 size of a granular material. (ASAE, 1998)

uniformity coefficient (Christiansen's) [CU, CCU] {fraction, %}: Measure of the uniformity of irrigation water application. The average depth of irrigation water infiltrated minus the average absolute deviation from this depth, all divided by the average depth infiltrated. (ASAE, 1998)

union: Pipe fitting used to connect two lengths of pipe in such a way that neither has to be rotated.

unreasonable uses: See **uses**.

unsaturated zone: Part of the soil profile in which the voids (pore spaces) are not completely filled with water. (ASAE, 1998)

usable precipitation: See **effective precipitation**.

uses:

- **consumptive:** Total amount of water taken up by vegetation for transpiration or building of plant tissue, plus the unavoidable evaporation of soil moisture, snow, and intercepted precipitation associated with vegetal growth. (ASAE, 1998)
- **nonconsumptive:** Water that leaves the selected region and not considered consumptive. Examples are runoff, deep percolation, and canal spills. (Burt et al., 1997)
- **beneficial** [BU]: Beneficial use of water supports the production of crops: food, fiber, oil, landscape, turf, ornamentals, or forage. ... (Burt et al., 1997)
- **nonbeneficial:** Water utilized in plant growth that cannot be attributed as beneficial.
- **reasonable:** In the context of irrigation performance, all beneficial uses are considered to be reasonable uses. Nonbeneficial uses are considered to be reasonable if they are justified under the particular conditions at a particular time and place. (Burt et al., 1997)
- **unreasonable:** Unreasonable uses are nonbeneficial uses that, furthermore, are not reasonable; that is, they are without economic, practical, or other justification. (Burt et al., 1997)

valve: Device to control flow. Valves used in pressurized systems include:

- **alfalfa:** Outlet valve attached to the top of a short vertical pipe (riser) with an opening equal in diameter to the inside diameter of the riser pipe and an adjustable lid or cover to control water flow. A ring around the outside of the valve frame provides a seat and seal for a portable hydrant. Typically used in border or basin irrigation. (ANSI/ASAE S261.7; NRCS)
- **angle:** Valve configured with its outlet oriented 90 degrees from its inlet.
- **air vent (air relief, air release):** Device that releases air from a pipeline automatically without permitting loss of water. (NRCS)
- **air vacuum, air relief:** Device that releases air from a pipeline automatically without permitting loss of water or admits air automatically if the internal pressure becomes less than atmospheric. (NRCS)

- **back flow prevention:** Check valve that allows flow in one direction. ... (NRCS) See specific valve for details.
- **ball:**
 - Valve in a pipeline used to start or stop flow by rotating a sealed ball with a transverse hole approximately equal to the diameter of the pipeline. Ball rotation is typically 90 degrees for a single-port control ... (NRCS)
 - Valve with an internally mounted ball with a hole in the center for water to pass through. (Rotation of the ball one-fourth turn opens and closes the valve.) (Rochester, 1995)
- **butterfly:** Valve in a pipeline to start or stop flow by rotating a disk 90 degrees. The disk is about the same diameter as the pipeline. ... (NRCS)
- **check:** Valve used in a pipeline that allows flow in only one direction. (NRCS)
- **chemigation:** Valve especially designed to be used with the injection of chemicals in an irrigation system.
- **corporation stop:** Quarter turn valve similar to a ball valve with two exceptions: internally there is a circular disk rather than a ball, and there is no attached handle. (Rochester, 1995)
- **curb stop:** Physically the same as **corporation stop** valve but used at a different location.
- **drain valve:**
 - **automatic:** Spring-loaded valve that automatically opens and drains the line when the pressure drops to near zero. (NRCS)
 - **flushing:** Valve on the end of a line to flush out dirt and debris. May be incorporated into an end plug or cap. (NRCS)
- **float valve:** Valve, actuated by a float, that automatically controls the flow of water. (NRCS)
- **foot valve:** Check valve used on the bottom of the suction pipe to retain the water in the pump when it is not in operation. (NRCS)
- **flow control:** Valve that automatically adjusts to provide a predetermined downstream flow.
- **gate:** Valve in a pipeline used to start or stop water flow. May be operated by hand with or without mechanical assistance or by high or low voltage (solenoid) electric-controlled mechanical assistance. Gate valves consist of seated slide or gates operated perpendicular to the flow of water. Head loss through a gate valve is typically less than a globe valve, but more than a ball or butterfly valve. (NRCS)
- **globe:** Valve in a pipeline used to start or stop water flow. Globe valves stop flow by positioning a disk and gasket over a machined seat about the same diameter as the pipe. Globe valves are limited to smaller sizes because of the high velocities and very high head loss through the valve. (NRCS)
- **hydraulic:** Irrigation zone valve that uses small flexible tubes and water under pressure to provide the actuation signal from the controller to the valve.
- **isolation:** Any mechanical valve used to isolate a section of a piping system.
- **master:** Valve used to protect the landscape from flooding in case of a ruptured main or malfunctioning downstream valve. The master valve is installed on the main line after the backflow preventer (in some systems). (Rain Bird, 1997)
- **orchard:** Outlet valve installed inside a short vertical pipe (riser) with an adjustable cover or lid for flow control. Similar to an **alfalfa** valve but with lower flow capacity. Typically used in basin irrigation. (ASAE, 1998)
- **pilot:** Small valve used to actuate a larger one.
- **pressure-regulating:** Valve designed to automatically provide a preset downstream pressure in a hydraulic system.
- **pressure relief:** Spring-loaded valve set to open at a pressure slightly above the operating pressure, used to relieve excessive pressure and surges. (NRCS)
- **pressure-sustaining:** Valve designed to provide a minimum preset upstream pressure.
- **quick-coupling:** Permanently installed valve that allows direct access to the irrigation main line. A quick-coupling key is used to open the valve. (Rain Bird, 1997)
- **remote control:** Valve that is actuated by an automatic controller by electric or hydraulic means. Synonymous with automatic control valve. (Rain Bird, 1997)
- **surge:** Device in a pipe T fitting to provide flow in alternate directions at timed intervals. Used in surge irrigation. (NRCS)
- **swing check:** See **check**.
- **vacuum relief valve:** Valve used to prevent a vacuum in pipelines and avoid collapsing of thin-wall pipe. (ASAE, 1998)

valve-in-head sprinkler: See **sprinkler head**.

vapor pressure (head): See **head**.

velocity [V,v] {ft/s, fps, m/s}: Usually refers to the average velocity computed as flow rate per unit area of a pipe. It is the speed at which water moves through the system (pipe). (Monroe, 1993)

velocity head: See **head**.

vertical turbine pump: See **pump**.

voids ratio: Ratio of the volume of voids (pores) to the volume of soil. (Hess, 1999)

voltage [V] {volt}:

- Force required to push and pull a stream of electrons through a circuit. (Derryberry, 2007)
- Amount of electrical potential required to force one amp of current flow in a circuit against one ohm of resistance. (Principles of Irrigation, 2012)

volute: Refers to the flow path of water and its associated pump casing as it leaves the impeller of a pump.

water allotment [WA] {ccf, m³}: A method to accurately and fairly estimate a total volume of water that should be allocated to a site.

water application efficiency: See **efficiency**.

water content (of soil sample): See **soil-water content**.

water conveyance efficiency: See **efficiency**.

water hammer {psi, kPa m}:

- Phenomenon that occurs when the velocity of water flowing in pipelines is rapidly changed, usually by a rapid or sudden gate or valve closure, starting or stopping of a pump, or sudden release of air. The resulting pressure waves pass through the water at high velocities and can produce very high momentary positive and/or negative pressures. ANSI/ASAE S261.7)
- Shock wave created when the flow of water in a piping system suddenly stops (or changes speed). Usually the result of a fast-closing (or opening) valve. (Rain Bird, 1997)

water pressure: See **pressure**.

water holding capacity {in./in., in./ft, mm/m}: Total amount of water held in the soil per increment of depth. It is the amount of water held between field capacity and oven dry moisture level. (NRCS)

water horsepower (water power): See **horsepower**.

water meter: Device used to measure the flow of water.

water rights: State administered legal rights to use water supplies derived from common law, court decisions, or statutory enactments. (NRCS)

water storage efficiency: See **efficiency**.

water table: Upper surface of a saturated zone below the soil surface where the water is at atmospheric pressure. (NRCS)

water use efficiency: See **efficiency**.

water window {h}: Time of day available for irrigation to occur. (Rain Bird, 1997)

weir: Flow measuring device for open-channel flow. Weirs can be either sharp-crested or broad-crested. Flow opening may be rectangular, triangular, trapezoidal (cipolletti), or specially shaped to make the discharge linear with flow depth (sutro weir). Calibration is based on laboratory ratings. (NRCS)

wet weight (of soil sample) [WW] {lbs, grams}: Weight of soil sample and included soil moisture. (*Principles of Irrigation*, 2012)

wetted area [A_s , WA] {ft², m²}: Surface area wetted at completion of irrigation. (Landscape, 1996) (Not used in *Landscape Irrigation Auditor, 2nd Edition*, 2010.)

wetted diameter: Preferred term **diameter of throw**.

wetting agent: Chemical used to reduce the surface tension of a liquid causing it to make better contact with the desired target.

wilting point [WP]: See **permanent wilting point**.

winterization: Process of removing water from the irrigation system before the onset of freezing temperatures. (Rain Bird, 1997)

wire gauge: One of several standard units of measure for wire size. The larger the gauge number, the smaller the wire. (Rain Bird, 1997)

work {hp-h, kw-h}: Work done by a force on a particle is defined as the product of the magnitude of the force and the distance through which the particle moves. In hydraulic systems, it can be calculated as the product of the pressure and flow rate. (Physics, 1962)

- **brake**: Measure of work input into a pump or other device
- **water**: Measure of work output from a pump.

working pressure {psi, pKa}: See **dynamic pressure**.

working storage [WS] {in., mm}: Amount of water available in the soil profile for plant use after consideration of MAD. Preferred term is **allowable depletion** [AD].

zone (irrigation): Section of an irrigation system served by a single control valve. Zones are comprised of similar sprinkler types and plant material types with similar water requirements and types. (Rain Bird, 1997)