

# Attachment 4

## FLORIDA IRRIGATION SOCIETY IRRIGATION STANDARDS

### GLOSSARY OF IRRIGATION TERMINOLOGY

**Absorption Rate (aka percolation rate):** The rate at which a soil will absorb water. It is not a constant rate for a given soil because it includes the infiltration rate and the water-holding capacity of the soil.

**Air Release Valve:** A valve that will automatically release to the atmosphere accumulated small pockets of air from a pressurized pipeline. A small orifice is used to release air at low flow rates. Air release valves are normally required at all summits of mainline and submain pipelines in an irrigation system.

**Anti-Siphon Device:** A safety device used to prevent backflow of irrigation water to the water source by back-siphonage.

**Application Efficiency (Ea):** The percentage of water applied by an irrigation system that is stored in the root zone and available for plant material use.

**Application Rate:** The average rate at which water is applied by an irrigation system, also called precipitation rate. Units are typically inches/hr or mm/hr.

**Arc (aka pattern):** The angle of coverage of a sprinkler in degrees from one side of throw to the other. A 90-degree arc would be a quarter-circle sprinkler.

**Atmospheric Vacuum Breaker:** An anti-syphon device that consists of an air inlet port and a float type check valve. Water draining back from irrigation lines is directed to the atmosphere to protect the potable water supply.

**Automatic Control Valve:** A valve in a sprinkler system that is activated by an automatic controller by way of hydraulic or electrical control lines.

**Automatic System:** An irrigation system that operates following a program using an automatic controller.

**Available Soil Water (AW):** The amount of water in the root zone that can be extracted by plants before permanent wilt. This is the difference between the water stored between field capacity (FC) and the permanent wilting point (PWP).

**Backflow:** Water which drains from an irrigation system back to the water source by back-pressure or back-siphonage.

**Backflow Prevention Device:** A safety device used to prevent pollution or contamination of the irrigation water supply due to backflow from the irrigation system.

**Belled (Pipe):** Pipe which is enlarged at one end so that the spigot end of another length of pipe can be inserted into it during the assembly of a pipeline.

**Bid Proposal:** Written price proposal presented to an irrigation system purchaser to provide all materials, equipment, and labor for a completely installed and operational system.

**Block (of sprinklers):** A group of sprinklers controlled by one valve. Also sometimes called zones or subunits.

**Block System:** An irrigation system in which several groups of sprinklers are controlled by one valve for each group.

**Body (of a sprinkler):** The exterior case or shell of the sprinkler.

**Border:** The edge of an area that is to be irrigated.

**Bubbler Irrigation:** The application of water to the soil surface or a container as a small stream or fountain. Bubbler emitter discharge rates are greater than .5 gph characteristic of drip emitters, but generally less than 4 gpm (240 gph). Because the infiltration rate of the

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soil is normally exceeded, a basin or container is usually required to contain or control the water.

**Capillary Water:** Water which remains in the soil pore spaces after gravity drainage has occurred. This water resides in the soil pores where capillary forces balance gravity forces so that further drainage is negligible.

**Check Valve:** A valve that permits water to flow in one direction only.

**Chemical Water Treatment:** The addition of chemicals to water to make it acceptable for use in irrigation systems. Chemical water treatment is primarily required for micro irrigation systems. Treatment may include the use of acids or biocides for pH adjustment or to prevent clogging of micro irrigation emitters, staining.

**Chemigation:** The application of water soluble chemicals by mixing or injecting with the water applied through an irrigation system.

**Christiansen's Uniformity Coefficient ( $C_u$ ):** A measure of the uniformity of water application calculated as 100% times the sum of the absolute values of the deviations of individual measurements from the mean, divided by the mean.

**Control Lines:** Hydraulic or electrical lines that carry signals (to open and close the valves) from the controller to the automatic valves.

**Control Station:** The assembly of components used to apply irrigation in an effective and timely manner. The control station may include facilities for water measurement, filtration, chemigation, pressure regulation, backflow prevention, scheduling of irrigations, and weather stations.

**Controller:** The timing mechanism used to control signals to the automatic control valves to open and close on a scheduled program or based on sensor readings.

**Contractor:** Any person who engages in the fabrication and installation of any type of irrigation system on a contractual basis.

**Consultant:** Any person who engages in the professional practice, receiving his compensation in the form of professional fees, including but not limited to: for the purpose of consulting, preparing plans, working drawings, specifications, budgeting, and estimating, on-site inspection of work in progress, conducting final inspection of completed work, or undertaking any other professional services related to irrigation systems.

**Coverage:** Refers to the way water is applied to an area. Typically coverage refers to the fraction of the volume of the root zone that is irrigated, or the fraction of the soil surface that is irrigated.

**Cycle:** Refers to one complete run of a controller through all programmed controller stations.

**Deep Percolation:** The amount of water that drains through the bottom of the root zone and is thus lost with respect to potential plant material use.

**Demand (or irrigation demand):** Refers to the irrigation requirements of the irrigated area. Demand primarily depends on the type of plant material, stage of growth, ET, soils, or other environmental conditions.

**Design Area:** The specific land area to which water is to be applied by an irrigation system.

**Design Emission Uniformity:** An estimate of the uniformity of water application with an irrigation system.

**Design Pressure:** The pressure at which the irrigation system or certain components are designed to operate. The irrigation system design pressure is that measured at the pump discharge or entrance to the system if there is no pump, and a zone design pressure is the average operating pressure of all sprinkler/emitters within a zone.

**Direct Burial Wire/cable:** Plastic-coated, single copper wire that is approved for direct burial by the NEC.

**Discharge Head:** The difference in elevation between the center line of the discharge pipe and the average point of discharge from the irrigation system, plus the friction head losses between these points, plus the subunit operating pressure, plus the velocity head. This is equivalent to the gauge pressure measured at the center line of the discharge pipe, in feet or meters.

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**Discharge Rate:** The instantaneous flow rate of an individual sprinkler, emitter, or other water emitting device, or a unit length of line-source micro irrigation tubing. Also, the flow rate from a pumping system. Discharge rates are expressed in units of volume per time such as gpm, gph, lph, or lpm.

**Distribution Uniformity (DU):** A measure of the uniformity of water application calculated as 100% times the average depth of water infiltrated or applied in the lowest 1/4 of the area tested, divided by the average depth applied.

**Double Check Valve:** An assembly of two single, independently-acting check valves with test ports to permit independent testing of each check valve.

**Drain Valve:** A valve used to drain water from a line. The valve may be manually or automatically operated.

**Drawdown:** The difference between the pumping and static water levels as water is pumped from a well. Units are usually in feet or meters.

**Drip Irrigation:** The precise low-rate application of water to or beneath the soil surface near or directly into the plant root zone. Applications normally occur as small streams or discrete or continuous drops measured gph. Emitters may be classified as point source, line source, or microsprays.

**Dual Check Valve –** A device consisting of independently acting, spring-loaded check valves usually requiring removal to test.

**Dynamic Head:** See Total Dynamic Head.

**Effective Rainfall:** That portion of rainfall that infiltrates into the soil and is stored in the plant root zone where it is available for plant use. Units are typically inches or millimeters.

**Effective Root Zone:** The depth of soil in which most of the plant roots actively involved in water extraction are located. This is usually the upper 50% to 75% of the plant root zone rather than the depth to which the deepest root penetrates. It is this zone in which irrigations should be concentrated.

**Electric Valves:** Valves actuated by electric current.

**Elevation Head:** The difference in pressure between two points of elevation. Usually expressed in feet or meters.

**Emitters:** Devices that are used to control the discharge of irrigation water from lateral pipes or tubing. This term is primarily used to refer to the low flow rate devices used in micro irrigation systems.

**Emitter Operating Flow:** The instantaneous discharge rate at a given operating pressure from a point-source emitter or from a unit length of line-source emitter, expressed as a volume per unit time such as gph, gpm.

**Evapotranspiration (ET):** The combined losses of water by evaporation from the soil and other surfaces and transpiration from plants, normally expressed in inches or millimeters per day. Also called water use rate or consumptive use rate.

**Fertigation:** The application of soluble fertilizers and/or nutrients with the water applied through an irrigation system.

**Field Capacity (FC):** The water content of the soil in the plant root zone after most gravity drainage has occurred, generally one to two days after rain or irrigation. FC is usually defined as the water content that exists when soil water tension is in the range of 0.1 bars (for sandy soils) to 0.33 bars (for heavier soils).

**Filtration System:** The assembly of physical components used to remove suspended solids from irrigation water. These include both pressure and gravity type devices, such as settling basins, screens, media filters, and centrifugal force units (vortex sand separators).

**Flow Meters:** Devices used to measure the volume of flow of water (typically in gallons), or flow rates (typically in gpm), and to provide data on system usage.

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**Friction Head (H<sub>f</sub>)check:** Friction head is expressed in units of feet or meters of water.

**Friction Loss:** The loss of pressure incurred when water is moving through pipelines. Losses depend on the smoothness of pipe, length and diameter of pipe, orifice sizes in components, mechanical restrictions, and flow velocity. Units are usually psi.

**Gravity Flow:** The flow of water due to gravitational forces only, i.e., water flowing downhill.

**Gravitational Water:** Water that moves into, through, or out of a soil under the influence of gravity forces. Gravitational water rapidly drains from the soil and is normally not available for plant use.

**Gauge (Wire):** Standard specification for wire size. The larger the gauge number, the smaller the wire diameter. Gauge is expressed as the American Wire Gauge (AWG) based on the circular mil system of one mil equals 0.001 inches.

**Head:** A sprinkler head. Sometimes used interchangeably with and in conjunction with "Sprinkler".

**Head:** Pressure per unit weight of water, a measure of pressure in terms of the height of a column of water that can be supported by that pressure. A 1.0 ft column of water is equivalent to .433 psi, or 2.31 ft of water = 1.0 psi.

**Header (header pipeline):** See manifold.

**Hydraulic Control Valve:** An automatic valve that is controlled by supplying and releasing water pressure to the diaphragm or piston of the valve through the use of hydraulic control tubing.

**Hygroscopic Water:** Water that is strongly bound to the soil particles, and which is thus unavailable for plant use.

**Infiltration Rate (aka percolation rate):** The rate of water flow from the surface of the soil and into the soil profile. Units are usually inches/hr.

**Irrigation:** Application of water by artificial means, that is, means other than natural precipitation. Irrigation is practiced to meet plant requirements, leach salts, apply chemicals, and for environmental control including plant cooling and freeze protection.

**Irrigation Interval:** The time period between the start of successive irrigations.

**Irrigation Frequency:** The numbers of irrigation cycles per day, week, or other time period

**Irrigation Schedule:** The watering plan or procedure which sets forth the operating time and frequency for each irrigation system zone.

**Irrigation Water Requirement or Irrigation Requirement:** The quantity of water that is required for plant growth, exclusive of effective rainfall. Irrigation requirement includes water needed for leaching, plant cooling, freeze protection, and other uses beneficial to plant growth. Irrigation requirement is normally expressed in units of inches. Net irrigation requirement (NIR) is the amount of water that must be supplied to the plant root zone. Gross irrigation requirement is the amount that must be diverted (pumped) from the water source and includes losses during conveyance and application.

**Irrigation Water Use Efficiency (Eu):** The ratio of water beneficially used in plant growth to water applied, expressed as a percentage.

**Landscape:** Refers to any and all areas that are planted, including but not limited to turf, ground covers, flowers, shrubs, trees, and similar plant materials as opposed to agricultural crops grown and harvested for monetary return.

**Leaching Requirement (LR):** The amount of water in excess of that which can be stored in the soil profile, to be applied during irrigation to ensure that excess salts are removed from the root zone by drainage. Units are usually inches.

**Lateral:** The water delivery pipeline that supplies water to emitters or sprinklers downstream from a control valve or manifold or header pipeline.

**Licensing Program:** A comprehensive legislated program, whereby any person desiring to do business serving the general public in a given craft, trade, or profession must obtain a license granted upon proof, through a qualifying examination, of compliance with experience

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requirements, and the meeting of other reasonable criteria, of his capability to satisfactorily perform such work plus proof of his capability and intentions of meeting such other requirements as may be deemed necessary for the protection of the health, safety, and general welfare of the public; and further providing suitable means of enforcement of the licensing regulations so established.

**Line-Source Emitters:** Lateral pipelines which are porous or contain closely-spaced perforations so that water is discharged as a continuous band or in overlapping patterns rather than discrete widely-spaced points along the pipeline length. Individual emitter flow rates do not generally exceed 4 GPH.

**Looped System:** A piping system that allows more than one path for water to flow from the supply to the emitters or sprinklers.

**Mainline:** A pipeline that carries water from the source to submains, control valves, manifolds or header pipelines of the water distribution system.

**Manifold:** The water delivery pipeline that conveys water from the main or submain pipelines to the laterals or control valves. Also sometimes called a header pipeline.

**Manual System:** A system in which control valves are manually operated rather than operated by automatic controls.

**Manufacturer's Coefficient of Variation (Cv):** A coefficient which describes the variation in discharge rate (standard deviation divided by the mean discharge rate) for a sample of new emitters or unit lengths of line-source emitter tubing when operated at design operating pressures. This term is also used to describe the expected variability in functioning of other irrigation system components, such as the variability in pressures from pressure control valves, discharge rates from flow control valves, etc.

**Meter Box (aka valve box):** A concrete or plastic box buried flush to grade which houses flow (water) meters or other components.

**Microirrigation:** The frequent application of small quantities of water directly on or below the soil surface, usually as discrete drops, tiny streams, or miniature sprays through emitters placed along the water delivery pipes (laterals). Micro irrigation encompasses a number of methods or concepts, including drip (Previously known as trickle irrigation, subsurface, bubbler, and micro spray irrigation).

**Micro spray irrigation – Water is applied by by a small spray or mist to the soil surface. Discharge rates generally do not exceed 30 GPH)**

**Microirrigation System:** The physical components required to apply water by micro irrigation. System components may include a pumping station, control station, filtration, pressure regulation, main and submain pipelines, lateral pipelines, emitters, valves, fittings, safety devices, and other items.

**Net Irrigation Requirement (NIR):** Water, in addition to that provided by precipitation, required to be provided to the plant root zone by irrigation to meet the plant water requirements.

**Nozzle:** The discharge orifice of the sprinkler head.

**Operating Cost:** The cost of operating an irrigation system, including the cost of water, pumping, repairs and labor.

**Operating Pressure:** The nominal or average pressure at which defined components of an irrigation system operate. Also see system operating pressure and subunit operating pressure.

**Overlap:** The amount one sprinkler pattern overlaps another. Expressed as a percentage of the diameter of coverage.

**Overwatering:** Applying more water than necessary to meet the design intent.

**PE Pipe:** Flexible polyethylene pipe for use in irrigation systems, normally manufactured with carbon black for resistance to degradation by ultraviolet radiation.

**Permanent Wilting Point (PWP):** Also called wilting point, PWP is the water content in the soil in the plant root zone when the plant can no longer extract water from the soil, and the plants die (permanently wilt).

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**Point-Source Emitters:** Individual water emitting devices that are widely spaced and discharge water at discrete points rather than by seepage along a porous pipe. Multiple-outlet point source emitters may discharge water at two or more emission points. This term is primarily used in reference to micro irrigation systems. Individual emitters generally do not have flow rates that exceed 2 GPH.

**Potable Water:** Water that is suitable in quality for human consumption.

**Precipitation:** The natural deposition on the earth's surface of water in the forms of rain, hail, sleet, snow, or mist (fog). In Florida, this term is often used as a synonym for rain.

**Precipitation Rate:** The average rate (in inches per hour) that precipitation occurs or which an irrigation system applies water to the irrigated surface.

**Pressure:** The energy contained in water due to confinement in an enclosed system (pipeline, pressure tank, etc.), specifically the energy per unit volume of water, measured in psi.

**Pressure Loss:** The loss of water pressure under flow conditions, primarily caused by friction or elevation changes.

**Pressure Rating (PR):** The estimated maximum pressure that water in a pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur.

**Pressure Relief Valve:** A valve that will open and discharge to atmosphere when the pressure in a pipeline or pressure vessel exceeds a pre-set point to relieve the high pressure condition.

**Pressure Vacuum Breaker:** A backflow prevention device that includes a spring-loaded check valve and a spring-loaded vacuum breaker to prevent the backflow of irrigation system water to the water source.

**Pumping Station:** The pump or pumps that provide water to an irrigation system, together with all of the necessary accessories such as bases or foundations, sumps, screens, valves, motor controls, safety devices, shelters and fences.

**PVC Pipe:** Polyvinyl chloride plastic pipe made in standard thermoplastic pipe dimensions and pressure rated for water.

**Rainswitch:** See rainfall shutoff device.

**Rainfall Shutoff Device:** A device designed to interrupt or cease automatic irrigation operation after a pre-determined amount of rainfall.

**Readily Available Soil Water (RAW):** The amount of water in the plant root zone that can easily be extracted by the plants. This is the amount of water that is often allowed to be extracted before an irrigation is scheduled. RAW is often assumed to be 1/3 to 2/3 (typically 1/2) of the available soil water (AW).

**Reclaimed Water:** The use of this term in these standards shall refer to water as defined under C62-610FAC for public access areas.

**Record Drawing:** A finished plan of an installed irrigation system designating valve, sprinkler and controller locations, routing of piping and control lines, and all other pertinent information.

**Riser:** A pipe to which sprinklers or other emitters are attached.

**Root Zone:** The depth of soil profile occupied by the roots of the plant being irrigated. Also see effective root zone.

**Soil Water Content (WC):** Also called the soil moisture content, WC is a measure of the water stored in the soil. WC<sub>v</sub> is the volumetric soil water content, which is the ratio of the volume of water stored per unit volume of soil, expressed as a percentage. WC<sub>g</sub> is the gravimetric water content, which is the ratio of the mass (weight) of water stored per unit mass (weight) of soil, expressed as a percentage. The volumetric soil water content is the preferred method of expressing soil water- holding capacity for irrigation purposes because, when WC<sub>v</sub> is multiplied by the soil depth, the result is the depth of water stored in that soil depth.

**Sleeve:** A pipe used to enclose other pipes, wire, or tubing usually under pavement, sidewalks, planters or concrete structures.

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**Spacing:** The distance between sprinklers or other emitters.

**Spray Irrigation:** The conveyance of water by fixed arc or rotors where the conveyance of water is through the air.

**Sprinkler:** The sprinkler head. Sometimes called "Head".

**Standard Dimension Ratio (SDR):** For O.D. controlled pipe, the ratio of the pipe O.D. to the wall thickness. For I.D. controlled pipe, the ratio of the pipe I.D. to the wall thickness.

**Static Head:** See elevation head.

**Static Pressure (Water Supply):** The pipeline or municipal water supply pressure when water is not flowing.

**Statistical Uniformity Coefficient (CUs):** A measure of uniformity of water application calculated from 100% times  $(1.0 - C_v)$ , where  $C_v$  is the statistical coefficient of variation calculated as the ratio of the standard deviation to the mean depth of application or flow rate measured.

**Subunit Operating Pressure:** The average operating pressure of all sprinklers or other water emitting devices operating simultaneously in an irrigation system subunit.

**Suction Head (H<sub>s</sub>):** The elevation difference between the water supply (including drawdown, when pumping from a well) plus the friction head losses upon entrance and within the suction pipeline. Units are typically feet or meters of water.

**Supply (Water Source):** The origin of the water used in the irrigation system.

**Surge:** An energy wave in pipelines, caused by sudden changes in water velocity, which causes a rapid increase or decrease in pipe pressure. Sudden velocity changes are caused by sudden opening or closing of valves, startup or shutdown of pumps, sudden air release, rapidly filling an empty pipeline, etc. Also called water hammer.

**Swing Gate Check Valve:** A check valve that allows water flow in only one direction by means of a hinged gate in the valve.

**Swing Joint:** A flexible connection between the lateral pipe and the sprinkler that allows the sprinkler to move when force is applied to it. This protects the lateral pipe and is used to easily position sprinklers at final grade.

**System Operating Pressure:** The average operating pressure at the inlet to the irrigation system control station, that is at the pump discharge, well discharge, or discharge from a public water system, typically given in psi. The system operating pressure must be greater than the subunit or emitter operating pressures because of pressure losses through system components as water flows through the irrigation system.

**Total Available Soil Water (TAW):** TAW is the total depth of water in the plant root zone that is available for plant use. It is calculated as the available water (AW) multiplied by the effective plant root zone depth. Units commonly used are inches.

**Total Dynamic Head (TDH):** TDH is the total irrigation system head when the system is in operation. TDH includes the sum of the static head, plus the friction head losses, plus elevation head, plus the irrigation distribution system operating pressure, plus drawdown when pumping from a well. Units are typically feet of water.

**Trickle Irrigation:** See Microirrigation.

**Tubing:** Generally used to refer to flexible plastic hydraulic lines that are usually constructed of PE or PVC.

**Two Wire Systems:** Two wire or decoder systems use a single pair of wires to operate a large number of stations with individual decoders.

**Uniformity Coefficient (C<sub>u</sub>):** A coefficient that expresses the degree of uniformity of water application or storage in an irrigated field. See also Christiansen's Uniformity Coefficient, Statistical Uniformity Coefficient, and Distribution Uniformity.

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**Uniformity of Water Application:** A measure of the spatial variability of water applied or stored over an irrigated field. The irrigation uniformity is usually expressed as a percentage, with 100% representing perfect uniformity.

**Usable Water:** See Available Water.

**Vacuum Breaker:** A type of backflow prevention device that reduces the potential for backflow of water by opening the pipeline to atmospheric pressure.

**Velocity (of Water):** The average speed at which water travels through pipe or tubing.

**Velocity Head (Hv):** The energy contained in flowing water because of its velocity or the energy required to accelerate the water to a given velocity. Hv is calculated from  $V^2/2.0g$ , where g is the acceleration of gravity (32.2 ft/sec/sec). Hv is a relatively small factor and need not be considered in design of most pressurized irrigation systems. Hv must be considered in the design of very low pressure, surface, and seepage irrigation systems.

**Water Amendment:** The addition of fertilizers, herbicides, insecticides, or other additives to irrigation water for the enhancement of plant production or to reduce emitter clogging or otherwise enhance irrigation system performance.

**Water Applied:** The amount of water actually applied during an irrigation cycle, expressed as a volume or depth. The water applied can be either more or less than the irrigation requirement.

**Water Demand:** The water requirements of an irrigation system necessary to operate the irrigation system.

**Water Requirement:** See Irrigation Requirement.

**Watering Schedule:** See Irrigation Schedule.

**Water Stored:** The amount of water that is stored in a plant root zone as the result of irrigation or rainfall, usually expressed as a depth of water in inches.

**Watering Time:** The duration of an irrigation cycle which is calculated from the system application rate, the net irrigation requirement, and the irrigation system application efficiency.

**Wilting Point:** See Permanent Wilting Point.

**Working Pressure:** The maximum pressure (psi) required at the water source when the irrigation system is in operation. Also see operating pressure.

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## FLORIDA IRRIGATION SOCIETY IRRIGATION STANDARDS – 2001

### REFERENCE LIST

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1. Florida & National Governmental requirements and listings:

**FAC** – S62–610, Part III (sub-sections 450 thru 491) : **Florida Administrative Codes** — Slow-Rate Land Application Systems; Public Access areas, Residential irrigation, and Edible crops

Florida Building Code

FS – Sec. 373.62: Florida Statutes Sections — Rainfall Devices

FS – Sec. 487.021 & 487.055: Florida Statutes Sections — Chemical Injections

NRCS – FL–430–DD: The new 1998 revision of the older Soil Conservation Service Codes by the National Resources Conservation Services – for water conveyance

NRCS – FL–642: The new 2000 revision of the older Soil Conservation Service Codes by The National Resources Conservation Services – for Wells and Pumps

2. American Society of Agricultural Engineers (ASAE) Partial listing of standards and practices:

ASAE S376.2 (JFEB04) — Design, Installation and Performance of Underground Thermoplastic Irrigation Pipelines

ASAE S397.2 (FEB03) — Electrical Service and Equipment for Irrigation

ASAE S398.1 (FEB04) — Procedure for Sprinkler Testing and Performance Reporting

ASAE S435 (FEB04) — Polyethylene Pipe Used for Microirrigation Laterals

ASAE EP400.2T (FEB04) — Designing and Constructing Irrigation Wells

3. American Society for Testing Materials (ASTM) Partial listing of standards:

ASTM A53/A53M-04a — Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A589-96 (2001) — Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe

ASTM D1785-04a — Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120

ASTM D2239-03 — Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

ASTM D2241-04b — Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D2464-02 — Standard Specification for Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D2466-02 — Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

ASTM D2564-04 — Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems

ASTM D2855-96 (2002) — Standard Practice for Making Solvent-Cemented Joints with Poly

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(Vinyl Chloride) (PVC) Pipe and Fittings

ASTM D3139-98 — Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

ASTM D412-98a (2002)e7— Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension

ASTM F477-02e7 — Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F656-02 — Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

#### 4. American Water Works Association (AWWA) Standards:

C510-97 — Double Check Valve Backflow Prevention Assembly

C511-97 — Reduced-Pressure Principle Backflow Prevention Assembly

C605-94 – Underground Installation of Polyvinyl Chloride (pvc) Pressure Pipe and Fittings for Water.

C900-97 — Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution

C901-96 — Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service

C905-97 — Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm), for Water Transmission and Distribution

#### 5. American Society of Sanitary Engineering (ASSE) — Product Performance Standards

# 1001 – Pipe Applied Atmospheric Type Vacuum Breakers — ANSI 1990/ASSE 1988

# 1013-2005 – Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers — ANSI/ASSE 1999

# 1015-2005 – Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies — ASSE/ANSI 1999

# 1020-2004 – Pressure Vacuum Breaker Assembly — ASSE 1998

# 1024-2004 – Dual Check Valve Backflow Preventers — ANSI/ASSE 1994

#### 6. Textbooks and Publications:

TURF IRRIGATION MANUAL by Richard B. Choate and James A. Watkins – A Telsco Publication – 5th Edition, May 1995

HANDBOOK OF TECHNICAL IRRIGATION INFORMATION by Hunter Industries Inc. – 1996

WATER AND THE LAND: A History of American Irrigation by Robert Morgan and The Irrigation Association – 1993

THE COMPLETE IRRIGATION WORKBOOK by Larry Keesen – 1995

PUBLICATIONS, NOTES, AND PAPERS by The Center of Irrigation Technology, California State University – Fresno, California

PUBLICATIONS and STANDARDS by The Florida Irrigation Society – Orlando, Florida

PUBLICATIONS, NOTES, AND PAPERS by The Institute of Food and Agricultural Sciences – University of Florida

PUBLICATIONS by The Irrigation Association – Falls Church, Virginia

INSTALLATION GUIDE FOR PVC PRESSURE PIPE by the Unibell PVC Pipe Association

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### ENTITIES WITH STANDARDS, SPECIFICATIONS AND PROCEDURES FOR IRRIGATION PRACTICE — Partial listing

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ANSI: American National Standards Institute, 1819 L Street, NW., Washington, DC.  
Phone: 202-293-8020 Fax: 202-293-9287 Web Site: [www.ansi.org](http://www.ansi.org)

ASAE: American Society of Agricultural Engineers, 2950 Niles Road St. Joseph, MI.  
Phone: 616-429-0300 Fax: 516-420-3852 E-mail: [www.asae.org](http://www.asae.org)  
<mailto:hq@asae.org>

ASSE: American Society of Sanitary Engineering, 901 Canterbury, Suite A, Westlake, OH.  
Phone: 440-835-3040 Fax: 440-835-3488 Web Site: [www.asse-plumbing.org](http://www.asse-plumbing.org)

ASTM: American Society of Testing Materials, 100 Barr Harbor Drive, West Conshohocken, PA.  
Phone: 610-832-9500 Fax: 610-832-9266 Web Site: [www.astm.org](http://www.astm.org)

AWWA: American Water Works Association, 6666 West Quincy Avenue, Denver, CO.  
Phone: 303-794-7711 Web Site: [www.awwa.org](http://www.awwa.org)

CIT: Center for Irrigation Technology, 5370 N. Chestnut M/S Of 18, Fresno, CA.  
Phone: 559-278-2066 Fax: 559-278-6033 Web Site: [www.atinet.org/cati/cit](http://www.atinet.org/cati/cit)

EPA: (U.S.) Environmental Protection Agency, 401 M Street, SW., Washington, DC.  
Phone: 202-260-4355 Fax: 202-260-3522 E-mail: [www.epa.gov](http://www.epa.gov)

FIS: Florida Irrigation Society, 1025 S. Semoran Blvd., Suite 1093, Winter Park, FL.  
Phone: 407-678-8119 Fax: 407-678-6494 E-mail: [www.fis1234@aol.com](mailto:www.fis1234@aol.com)  
Web Site: [www.fisstate.org](http://www.fisstate.org)

FS: Florida Statutes, State of Florida - Web Site: [www.state.fl.us/statutes](http://www.state.fl.us/statutes)

IA: Irrigation Association, 6540 Arlington Blvd., Falls Church, VA.  
Phone: 703-536-7080 Fax: 703-536-7019 Web Site: [www.irrigation.org](http://www.irrigation.org)

IFAS: Institute for Food and Agricultural Sciences, University of Florida, Gainesville, FL.  
Phone: (UF) 352-392-3261 or (IFAS) 352-392-1971 Web Site: [www.ifas.ufl.edu](http://www.ifas.ufl.edu)

ISO: International Organization for Standardization, Geneva, Switzerland  
Phone: 41-22-749-01-11 Fax: 41-22-733-34-30 Web Site: [www.iso.ch](http://www.iso.ch)

LCCC: Irrigation Management Program, Lake City Community College, Lake City, FL.  
Phone: 904-752-1822 Fax: 904-755-1856 Web Site: [www.irrigationschool.org](http://www.irrigationschool.org)

NRCS: Natural Resources Conservation Service, P.O. Box 2890, Washington, DC  
(Formerly known as the Soil Conservation Service)  
Phone: 202-720-4525 Fax: 202-720-7690 Web Site: [www.fl.nrcs.usda.gov](http://www.fl.nrcs.usda.gov)

SWCS: Soil & Water Conservation Society, 7515 NW Ankeny Road, Ankeny, IA.  
Phone: 515-289-2331 Fax: 515-289-1227 Web Site: [www.swcs.org](http://www.swcs.org)  
<http://www.iso.org>

FAC: Florida Administrative Code  
<http://fac.dos.state.fl.us>

FBC: Florida Building Code  
[www.floridabuilding.org](http://www.floridabuilding.org)