SECTION 223100 - DOMESTIC WATER SOFTENERS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

This Section may include provisions for LEED 2009, LEED v4, ASHRAE 189.1, IgCC, and Green Globes. Some sustainable design requirements are either mandatory or optional and may be inserted into the Section Text using the hypertext links. Other requirements that are associated with sustainable design, and may be considered "best practice" or retained even if a sustainable design standard is not a project requirement, are discussed in the Evaluations.

1. GENERAL
   * + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
      1. SUMMARY
         1. Section Includes:

Water softeners.

Chemicals.

Water-testing sets.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water softeners.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

* + - * 1. Shop Drawings:

Include diagrams for power, signal, and control wiring.

Retain "Seismic Qualification Data" paragraph below if required by seismic criteria applicable to Project. Coordinate with Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." See ASCE/SEI 7 for certification requirements for equipment and components.

* + - * 1. Seismic Qualification Data: Certificates, for water softeners, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

* + - * 1. Source quality-control reports.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.
        2. Sample Warranty: For special warranty.
      1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For water softeners to include in emergency, operation, and maintenance manuals.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Furnish extra materials[**, from the same product run,**] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Salt for Brine Tanks: Furnish in same form as and at least [**four**] <**Insert number**> times original load, but not less than [**200**] [**1000**] <**Insert weight**> lb. Deliver on pallets according to the following:

Retain one or more of first four subparagraphs below; revise package size as required.

Food-Grade Pellet Salt: In [**40- or 50-**] [**80-**] <**Insert weight**> lb packages.

Plain Pellet Salt: In [**40- or 50-**] [**80-**] <Insert weight> lb packages.

Crystallized Solar Salt: In [**40- or 50-**] [**80-**] <**Insert weight**> lb packages.

Plain, Brine Block Salt: In [**50-**] <**Insert weight**> lb blocks.

Store salt on raised platform where directed by Director’s Representative. Do not store in contact with concrete floor.

* + - 1. COORDINATION

Retain this article for water softeners where indicated.

* + - * 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
      1. WARRANTY

When warranties are required, verify with Director’s Representative's counsel that special warranties stated in this article are not less than remedies available to Director’s Representative under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer agrees to repair or replace components of water softeners that fail in materials or workmanship within specified warranty period.

Failures include, but are not limited to, the following:

Structural failures of mineral and brine tanks.

Faulty operation of controls.

Deterioration of metals, metal finishes, and other materials beyond normal use.

Attrition loss of resin exceeding 3 percent per year.

Mineral washed out of system during service run or backwashing period.

Effluent turbidity greater and color darker than incoming water.

Fouling of underdrain system, gravel, and resin with turbidity or by dirt, rust, or scale from water softener or soft water, while operating according to manufacturer's written operating instructions.

Verify available warranties and warranty periods on water softeners.

Water Softeners, Warranty Period: From date of Substantial Completion.

Mineral Tanks: [**Five**] [**10**] <**Insert number**> years.

Brine Tanks: [**10**] <**Insert number**> years.

Control Valve: [**One**] <**Insert number**> year(s).

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

1. PERFORMANCE REQUIREMENTS
   * + - 1. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

Retain "Seismic Performance" paragraph below with "Seismic Qualification Data" paragraph in "Informational Submittals" Article for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with structural.

* + - * 1. Seismic Performance: Water softeners shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

Retain subparagraph below to define the term "withstand" as it applies to this Project. Definition varies with type of building and occupancy and is critical to valid certification. Option is used for essential facilities where equipment must operate immediately after an earthquake.

The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."

If Project has more than one type or configuration of water softener, delete "Capacities and Characteristics" paragraph below and schedule water softeners on Drawings.

* + - * 1. Capacities and Characteristics:

Water Analysis:

Hardness: <**Insert number**> grains/gal. or ppm.

Iron: <**Insert number**> ppm.

Dissolved Solids: <**Insert number**> ppm.

Concentration: <**Insert pH**>.

Inlet Water Pressure: <**Insert number**> psig.

Water Temperature: <**Insert number**> deg F.

Continuous Service Flow Rate: <**Insert number**> gpm at 15-psig pressure drop.

Peak Service Flow Rate: <**Insert number**> gpm at 25-psig pressure drop.

Water Meter Size: <**Insert number**> NPS.

Manifold Pipe Size: <**Insert number**> NPS.

Backwash-to-Drain Pipe Size: <**Insert number**> NPS.

Water Consumption: <**Insert number**> gal./day.

Water Demand: <**Insert hours/day**>.

Number of mineral tanks in first subparagraph below must match option retained in "Configuration" subparagraph in "Water Softeners" Article.

Number of Mineral Tanks: [**One**] [**Two**] [**Three**] <**Insert number**>.

Mineral Quantity, Each Tank: <**Insert number**> cu. ft..

Mineral Exchange Capacity: <**Insert number**> grains/cu. ft. per lb of salt.

Electrical Characteristics:

Volts: <Insert number> V.

Phases: <Insert number>.

Hertz: <**Insert number**> Hz.

Full-Load Amperes: <**Insert number**> A.

Minimum Circuit Ampacity: <**Insert number**> A.

Maximum Overcurrent Protection: <**Insert number**> A.

Salt Capacity: <**Insert number**> lb.

Minimum Number of Regenerations per Refill: <**Insert number**>.

Floor Area Required: <**Insert number**> sq. ft..

Height Required: <**Insert number**> inches.

1. WATER SOFTENERS

Revise this article to include additional features and accessories for water softeners. If more than one type is required, identify specific features and accessories for each type in a schedule on Drawings using terms in this article. Water softeners described below are appropriate for a service flow rate of 8 gpm (0.5 L/s) and higher, for commercial or industrial applications.

See the Water Softener Schedule at the end of the Evaluations for types of manufacturers' products. Use this table in combination with manufacturers' catalogs or product data to insert series, type, model, and designations of other characteristics.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=13386) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[3M](http://www.specagent.com/Lookup?uid=123457132679).

[Diamond Water Conditioning; a Griesbach company](http://www.specagent.com/Lookup?uid=123457132678).

[Ecodyne Limited](http://www.specagent.com/Lookup?uid=123457132680).

[Kinetico Incorporated](http://www.specagent.com/Lookup?uid=123457132665).

Culligan, Inc

Or equal.

* + - * 1. Description: Factory-assembled, pressure-type water softener.

Configuration: [Single unit with one mineral tank] [Twin unit with two mineral tanks] [Triple unit with three mineral tanks] <Insert configuration> and one brine tank.

Mounting: On skids.

If water temperature will be above 120 deg F (49 deg C), contact manufacturer of selected softener to verify that components are suitable.

Wetted Components: Suitable for water temperatures from [**40 to at least 100 deg F**] [**40 to at least 120 deg F**] [**40 to at least 150 deg F**] <Insert temperature>.

Retain one of two "Mineral Tanks" subparagraphs below.

Mineral Tanks: FRP, pressure-vessel quality.

Construction: [Non-ASME code.] [Fabricated and stamped to comply with ASME Boiler and Pressure Vessel Code: Section X, "Fiber-Reinforced Plastic Pressure Vessels."]

First option in "Pressure Rating" subparagraph below is usual minimum pressure rating; use higher rating if required.

Pressure Rating: [**100**] [**125**] <**Insert pressure**> psig minimum.

Freeboard: 50 percent minimum for backwash expansion above normal resin bed level.

Support Legs or Skirt: Constructed of structural steel, welded to tank[**before testing and labeling**].

Upper Distribution System: Single, point type, fabricated from galvanized-steel pipe and fittings.

Lower Distribution System: Hub and radial-arm or header-lateral type; fabricated from nonmetallic pipe and fittings with individual, fine-slotted, nonclogging plastic strainers, and arranged for even flow distribution through resin bed.

Retain "Liner" subparagraph below for potable water.

Liner: PE, ABS, or other material suitable for potable water.

Mineral Tanks: [**Steel**] [**Stainless steel**], electric welded; pressure-vessel quality.

Retain "Seismic Requirements" subparagraph below for projects in seismic areas.

Seismic Requirements: Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.

Construction: [Non-ASME code.] [Fabricated and stamped to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.]

First option in "Pressure Rating" subparagraph below is usual minimum pressure rating; use higher rating if required.

Pressure Rating: [**100**] [**125**] [**150**] <**Insert pressure**> psig minimum.

Freeboard: 50 percent minimum for backwash expansion above normal resin bed level.

Revise tank size in "Handholes" and "Manhole" subparagraphs below to suit Project. Some manufacturers offer manholes in tanks with smaller diameters.

Handholes: 4 inches round or 4 by 6 inches elliptical, in top head and lower sidewall of tanks [**30**] <**Insert dimension**> inches and smaller in diameter.

Manhole: 11 by 15 inches in top head of tanks larger than [**30**] <**Insert dimension**> inches in diameter.

Support Legs or Skirt: Constructed of structural steel, welded to tank[**before testing and labeling**].

Retain one of two "Finish" subparagraphs below; delete both if tanks are stainless steel.

Finish: Hot-dip galvanized on exterior and interior of tank after fabrication unless tank is stainless steel.

Finish: Exterior of tank spray-painted with rust-resistant prime coat, 2- to 3-mil dry film thickness. Interior sandblasted and lined with epoxy-polyamide coating, 8- to 10-mil dry film thickness.

Upper Distribution System: Single, point type, fabricated from galvanized-steel pipe and fittings.

Lower Distribution System: Hub and radial-arm or header-lateral type; fabricated from PVC pipe and fittings with individual, fine-slotted, nonclogging PE strainers, and arranged for even flow distribution through resin bed.

Retain "Liner" subparagraph below for potable water; delete if tanks are stainless steel.

Liner: PE, ABS, or other material suitable for potable water.

Retain one of two "Controls" subparagraphs below. Retain first subparagraph if regeneration must be started manually. Operations subsequent to regeneration are performed automatically.

Controls: Automatic; [**120**] <**Insert number**> V; factory wired and factory mounted on unit.

Adjustable duration of various regeneration steps.

Push-button start and complete manual operation.

Electric time clock and switch for automatic operation except for manual return to service.

Sequence of Operation: Multiport pilot-control valve automatically pressure-actuates main operating valve through steps of regeneration.

Pointer on pilot-control valve shall indicate cycle of operation.

Includes means of manual operation of pilot-control valve if power fails.

Retain "Controls" subparagraph below for operation where first regeneration must be started manually. Operations subsequent to regeneration and return to service are performed automatically. Regeneration operations subsequent to first regeneration are performed automatically.

Controls: Fully automatic; [**120**] <**Insert number**> V; factory wired and factory mounted on unit.

Adjustable duration of various regeneration steps.

Push-button start and complete manual operation.

Electric time clock and switch for fully automatic operation, adjustable to initiate regeneration at any hour of day and any day of week or at fixed intervals.

Sequence of Operation: Multiport pilot-control valve automatically pressure-actuates main operating valve through steps of regeneration and return to service.

Pointer on pilot-control valve shall indicate cycle of operation.

Includes means of manual operation of pilot-control valve if power fails.

Retain "Main Operating Valves" subparagraph below with one of two "Controls" subparagraphs above.

Main Operating Valves: Industrial, automatic, multiport, diaphragm type with the following features:

Slow opening and closing, non-slam operation.

Diaphragm guiding on full perimeter from fully open to fully closed.

Isolated, dissimilar metals within valve.

Self-adjusting, internal, automatic brine injector that draws brine and rinses at constant rate independent of pressure.

Retain first subparagraph below only for single mineral-tank units.

Valve for single mineral-tank unit with internal automatic bypass of raw water during regeneration.

Sampling cocks for soft water.

Special tools are not required for service.

Flow Control: Automatic, to control backwash and flush rates over wide variations in operating pressure; does not require field adjustments.

Retain "Meter Control" subparagraph or one of five "Demand-Initiated Control" subparagraphs below.

Meter Control: Each mineral tank is equipped with signal-register-head water meter that produces electrical signal indicating need for regeneration on reaching hand-set total in gallons. Signal will continue until reset.

Retain first "Demand-Initiated Control" subparagraph below only for single mineral-tank units.

Demand-Initiated Control: Single mineral tank is equipped with automatic-reset-head water meter that electrically activates cycle controller to initiate regeneration at preset total in gallons. Head automatically resets to preset total in gallons for next service run.

Retain first "Demand-Initiated Control" subparagraph below only for twin mineral-tank units.

Demand-Initiated Control: Each mineral tank of twin mineral-tank unit is equipped with automatic-reset-head water meter that electrically activates cycle controllers to initiate regeneration at preset total in gallons. Head automatically resets to preset total in gallons for next service run. Electrical lockout prevents simultaneous regeneration of both tanks.

Retain first "Demand-Initiated Control" subparagraph below only for twin mineral-tank units.

Demand-Initiated Control: Each twin mineral-tank unit is equipped with automatic-reset-head water meter, in common outlet header, that electrically activates cycle controller to automatically regenerate one mineral tank at preset total in gallons and divert flow to other tank. Automatically repeats with other tank. Electrical lockout prevents simultaneous regeneration of both tanks.

Retain first "Demand-Initiated Control" subparagraph below only for units with three or more mineral tanks.

Demand-Initiated Control: Each mineral tank of multiple mineral-tank unit is equipped with automatic-reset-head water meter that electrically activates cycle controllers to automatically regenerate at preset total in gallons. Head automatically resets to preset total in gallons for next service run. Electrical lockout prevents simultaneous regeneration of more than one tank.

First "Demand-Initiated Control" subparagraph below may be used with any multiple mineral-tank arrangement.

Demand-Initiated Control: Each multiple mineral-tank unit is equipped with automatic-reset-head water meter, in common outlet header, that electrically activates cycle controller to automatically regenerate one mineral tank at preset total in gallons and divert flow to other tanks. Automatically repeats with other tanks. Electrical lockout prevents simultaneous regeneration of more than one tank.

Brine Tank: Combination measuring and wet-salt storing system.

Tank and Cover Material: Fiberglass, 3/16 inch thick; or molded PE, 3/8 inch thick.

Brine Valve: Float operated and plastic fitted for automatic control of brine withdrawal and freshwater refill.

Size: Large enough for at least four regenerations at full salting.

Factory-Installed Accessories:

Piping, valves, tubing, and drains.

Sampling cocks.

Main-operating-valve position indicators.

Water meters.

1. CHEMICALS
   * + - 1. Mineral: High-capacity, sulfonated-polystyrene, ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock.

Insert more capacity in "Exchange Capacity" subparagraph below for high-temperature water or other applications as required. Natural zeolite minerals that cost less may also be used but require replacement more often than resin.

Exchange Capacity: [**30,000**] <**Insert capacity**> grains/cu. ft. of calcium carbonate of resin when regenerated with 15 lb. of salt.

* + - * 1. Salt for Brine Tanks: High-purity sodium chloride, free of dirt and foreign material. Rock and granulated forms are unacceptable.

Form: Processed, [food-grade salt pellets] [plain salt pellets] [crystallized solar salt collected from shallow ponds and milled into irregular particles] [plain, brine block salt].

* + - 1. WATER-TESTING SETS
         1. Description: Manufacturer's standard water-hardness testing apparatus and chemicals with testing procedure instructions. Include metal container suitable for wall mounting.

1. SOURCE QUALITY CONTROL
   * + - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

Retain "ASME Compliance for Steel Tanks" or "ASME Compliance for FRP Tanks" paragraph below, or both, only if ASME-code mineral tanks are specified.

* + - * 1. ASME Compliance for Steel Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, where indicated.
        2. ASME Compliance for FRP Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, where indicated.
        3. UL Compliance: Fabricate and label water softeners to comply with UL 979, "Water Treatment Appliances."
        4. Hydrostatically test mineral tanks before shipment to a minimum of one and one-half times the pressure rating.
        5. Prepare test and inspection reports.

1. EXECUTION
   * + 1. WATER SOFTENER INSTALLATION
          1. Equipment Mounting:

Retain first subparagraph below to require equipment to be installed on cast-in-place concrete equipment bases.

Install water softeners on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

Retain one of or both subparagraphs below. Retain first for projects in seismic areas; second, for projects not in seismic areas. Indicate vibration isolation and seismic-control device type and minimum deflection in supported equipment schedule on Drawings.

Comply with requirements for vibration isolation and seismic-control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

Retain first paragraph below for Project in a seismic area; insert special requirements for seismic restraints or indicate on Drawings.

* + - * 1. Install seismic restraints for tanks and floor-mounting accessories and anchor to building structure.
        2. Install brine lines and fittings furnished by equipment manufacturer, but not specified to be factory installed.
        3. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.
        4. Install water-testing sets mounted on wall, unless otherwise indicated, and near water softeners.
      1. PIPING CONNECTIONS

Coordinate piping installations and specialty arrangements with Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
        2. Where installing piping adjacent to equipment, allow space for service and maintenance.
        3. Install shutoff valves on raw-water inlet and soft-water outlet piping of each mineral tank[**, and on inlet and outlet headers**].
        4. Install pressure gauges on raw-water inlet and soft-water outlet piping of each mineral tank.

Retain first "Exception" subparagraph below if factory-installed pressure gauges are acceptable.

Exception: Water softeners with factory-installed pressure gauges at locations indicated.

Retain one of or both "Exception" subparagraphs below only if pressure gauges are not required.

Exception: Household water softeners.

Exception: Water softeners in hot-water service.

* + - * 1. Install valved bypass in water piping around water softeners.
        2. Install indirect wastes to spill into open drains or pit with drain.
      1. ELECTRICAL CONNECTIONS
         1. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
         2. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
         3. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
      2. IDENTIFICATION
         1. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
      3. FIELD QUALITY CONTROL

Retain one of first four paragraphs below. Retain first "Testing Agency" paragraph below if Director’s Representative will hire an independent testing agency.

* + - * 1. Testing Agency: Director’s Representative will engage a qualified testing agency to perform tests and inspections.

Retain "Testing Agency" paragraph below to require Contractor to hire an independent testing agency.

* + - * 1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

Retain "Manufacturer's Field Service" paragraph below to require a Company Service Advisor to perform tests and inspections.

* + - * 1. Manufacturer's Field Service: Engage a Company Field Advisor to test and inspect components, assemblies, and equipment installations, including connections.

Retain "Perform tests and inspections" paragraph below to require Contractor to perform tests and inspections and retain option to require Contractor to arrange for the assistance of a Company Service Advisor.

* + - * 1. Perform tests and inspections with the Company Field Advisor.

Retain test requirements below with any combination of paragraphs above.

* + - * 1. Tests and Inspections:

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

* + - * 1. Water softeners will be considered defective if they do not pass tests and inspections.
        2. Prepare test and inspection reports.
      1. STARTUP SERVICE

Retain this article if a Company Service Advisor is required.

* + - * 1. Engage a Company Field Advisor to perform startup service.

Complete installation and startup checks according to manufacturer's written instructions.

* + - * 1. Add water to brine tanks and fill with the following form of salt:

Water Softeners: Processed, [plain salt pellets] [crystallized solar salt collected from shallow ponds and milled into irregular particles] [plain, brine block salt] <Insert salt form>.

* + - * 1. Sample water softener effluent after startup and at three consecutive seven-day intervals (total of four samples) and prepare certified test reports for required water performance characteristics. Comply with the following:

ASTM D859, "Test Method for Silica in Water."

ASTM D1067, "Test Methods for Acidity or Alkalinity of Water."

ASTM D1068, "Test Methods for Iron in Water."

ASTM D1126, "Test Method for Hardness in Water."

ASTM D1129, "Terminology Relating to Water."

ASTM D3370, "Practices for Sampling Water from Closed Conduits."

* + - 1. MAINTENANCE SERVICE

Consider deleting this article for light use; usually retain for critical units.

* + - * 1. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include [**three**] [**six**] [**nine**] [**12**] months' full maintenance by skilled employees of water softener Installer. Include [**monthly**] [**quarterly**] preventive maintenance, repair, or replacement of worn or defective components, cleaning, and adjusting as required for proper water softener operation at rated capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

If needed, retain "Continuing Maintenance Proposal" paragraph below. Revise starting date if required.

* + - * 1. Continuing Maintenance Proposal: From Installer to Director’s Representative, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
      1. DEMONSTRATION
         1. Engage a Company Field Advisor to train Director’s Representative's Facility’s maintenance personnel to adjust, operate, and maintain domestic water softeners.
         2. Instruction of State Personnel: The Company Field Advisor shall instruct Director’s Representative's Facility’s maintenance personnel in the operation and maintenance of the Water Softener system and all accessories. **[Provide a minimum of 8 hours for on-site instruction purposes, exclusive of all pre-start-up, start-up and service call time].** **[Provide a minimum of 16 hours for on-site instruction purposes, in two 8-hour intervals, exclusive of all pre-start-up, start-up and service call time at facilities that operate multiple shifts of maintenance staff per day].**

END OF SECTION 223100