

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

SECTION 22 8000 - ANIMAL WATERING SYSTEM

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in **bold**.

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

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and special Conditions for Construction*.

1.2 SUMMARY

- A. Section Includes:
 - 1. Automated water distribution system.
 - 2. Pressure reducing stations.
 - 3. Automatic flush system.
 - 4. Chlora-flush station.
 - 5. Portable sanitizer.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's data for each component and item of equipment specified. Include component dimensions, configurations, construction details, joint details, and utility service requirements and locations.
- B. Shop Drawings: Provide large scale plans and elevations of system. Indicate relation of units to surrounding walls, doors and other building components. Provide rough-in plan drawings for coordination with other trades.

University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

- C. Provide operation and maintenance manuals with full parts and distribution centers, factory trained and authorized dealers, schematics on processors and sensor modules.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Animal watering system shall be manufactured and installed by a single supplier.
- B. Manufacturer's Qualifications: Five years or more experience as manufacturer of animal room watering systems.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect equipment from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.
- B. Protect equipment throughout construction period.

1.6 PROJECT CONDITIONS

- A. Do not deliver or install equipment until the following conditions have been met:
 - 1. Windows and doors are installed, and the building is secure and weather tight.
 - 2. Ceilings, overhead ductwork and lighting are installed.
- B. The Contractor shall be responsible for any alterations to mechanical or electrical service shown on the Drawings or indicated in these Specifications that are necessary to accommodate the manufacturer's product requirements.

1.7 WARRANTY

- A. All equipment furnished under this Section of the Specifications shall be guaranteed for a period of one year from the date of acceptance against defective materials, design and workmanship.
- B. Equipment manufacturer's warranties shall be made to the benefit of the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Edstrom Automated Watering Systems
- B. No substitutions.

2.2 STAINLESS STEEL ROOM DISTRIBUTION SYSTEM

- A. General

<Insert A/E Name>

AE Project #: <Insert Project Number>

Animal Watering System

UH Master: 08.2023

22 8000 - 2

University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

1. Provide a stainless steel water delivery piping system designed specifically for an animal automated drinking water system. The system operates normally at a low pressure of 3-5 psi, but is subjected to flushing pressures up to 50 psi.
2. Include receiving, handling, storage and installation of stainless steel tubing and fittings for an animal drinking water system.
3. Manufacture, furnish and install materials in accordance with this specification and applicable codes and standards.
 - a. ANSI/ASTM Standard A450 stainless steel tubing.
4. Purchase the complete piping system from a single manufacturer. Factory cut and fabricate tubing to system-designed lengths, electropolish and passivate and then cap and/or seal in a bag and suitably box for shipping protection. Individually bag each fitting and suitably box for shipping protection.
5. Inspect shipping cartons upon delivery for damage and material cleanliness. Report promptly any damaged material to the manufacturer.
6. Handle tubing to avoid bending or damage. Keep materials clean and free from grease and oil. Store all tubing and fittings in their original package until ready to use.
7. Store all system material in an area segregated from other construction material. Choose a location inside a building protected from any corrosive atmosphere. Limit access to protect against physical damage, loss and contamination.

B. Parts

1. Room distribution piping and fittings

Distribute water from a pressure reducing station into and around each animal room and to flush drain points. Provide minimum 200 psi pressure rating. Use piping/fitting design to allow mechanical dismantling for repair or replacement of individual components. Soldered, brazed or adhesive bonded joints are not permitted. Electropolish externally and passivate all water contact surfaces to attain a uniform oxide inactive surface film.

 - a. Stainless steel welded tubing
 - 1) .50" OD x .035" wall
 - 2) 316 L grade
 - b. Electropolish/passivation process
 - 1) Electropolish in 135°F solution of 65% phosphoric - 35% sulfuric acid
 - 2) Passivate in 105°F solution of 20% nitric - 80% water
 - 3) Final rinse with 125°F Reverse Osmosis water to remove all chemical residues
 - 4) Electropolish and passivate after all fabrication and welding
 - c. Coupling, elbow, tee fittings

<Insert A/E Name>

AE Project #: <Insert Project Number>

Animal Watering System

UH Master: 08.2023

22 8000 - 3

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- 1) Clean Fitting or equivalent sanitary type
 - 2) 316 L grade stainless steel
 - 3) ID: .43" to exactly match tubing ID
 - 4) Electropolish both internally and externally and passivate in accordance with 2.1.2 to a finish of 32 RA or better on all water contact surfaces
 - 5) Joint Seal
 - a) High grade FDA approved silicone
 - b) Seal edge width: .05"
 - c) ID: .43" for flush internal joint
 - d) Ferrule: 316 Stainless Steel
 - e) Retainer hex nut: 303 stainless steel
 - d. Interconnect Station (I/C) Assembly
 - 1) Prefabricated piping assembly with a Quick Disconnect (QD)/half coupling fitting welded to one end
 - 2) Clean Fitting connection or equivalent sanitary type
 - 3) QD Type: Industry Standard 1/4" universal style socket
 - 4) Design characteristics in accordance with base fitting of QD welded at branch port
 - 5) QD base fitting
 - a) 316 L grade stainless steel
 - b) Fitting length of 1.03 inches from tubing ID to QD seal
 - 6) QD components
 - a) 316 grade stainless steel
 - b) Electropolish both internally and externally and passivate in accordance to a finish of 32 RA or better on all machined water contact surfaces
 - c) QD Seal: High grade FDA approved silicone
 - 7) Deburr open end of pipe to make it Clean Fitting ready for field assembly
 - e. Pipe/Coupler Assembly
 - 1) Prefabricated piping assembly with a half coupling fitting welded to one end
 - 2) Clean Fitting connection or equivalent sanitary type
 - 3) Deburr open end of pipe to make it Clean Fitting ready for field assembly
2. Interconnect station (I/C)

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

Provide I/C station in each animal room as shown on Drawings and/or to adequately accommodate manifold connection for mobile or stationary racks or kennel/pen arrangements.

- a. I/C Connection: Edstrom I/C Assembly with universal style QD socket for hose connection
- b. Use Pipe/Coupler assembly for all piping runs not requiring I/C connections.

[EDIT SUPPLY HOSE ASSEMBLY TO SUIT PROJECT]

3. Detachable Kynar Recoil Hose

Provide animal rack water supply hose assembly that can be detached from the room piping for sanitization or during periods of non-use.

- a. Tubing coil: Black PVDF (Kynar) (3/8 inch OD x ¼ inch ID, NSF standard 61, FDA grade, chlorine tolerance of .5 to 50 ppm)
- b. Extended Reach: Six feet
- c. Autoclavability: Maximum temperature of 250°F
- d. Quick disconnect couplings - Universal style
 - 1) QD plug on upper end
 - 2) QD socket on lower end
 - 3) 316 grade stainless steel
 - 4) Electropolish both internally and externally and passivate to a finish of 32 RA or better on all machined water contact surfaces
 - 5) QD Seal: High grade FDA approved silicone
 - 6) Push lock barb connection
- e. Stainless steel spring supports (three inches long) both ends.

4. Detachable Primate Hose

Provide animal rack water supply hose assembly that can be detached from the room piping for sanitization or during periods of non-use.

- a. Tubing: Black PVDF (Kynar) (3/8 inch OD x ¼ inch ID, NSF standard 61, FDA Grade, chlorine tolerance of .5 to 50 ppm)
- b. Hose Length: Five feet
- c. Autoclavability: Maximum temperature of 250°F
- d. Quick disconnect couplings - Universal style
 - 1) QD plug on upper end
 - 2) QD socket on lower end
 - 3) 316 Grade stainless steel

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- 4) Electropolish both internally and externally and passivate to a finish of 32 RA or better on all machined water contact surfaces
 - 5) QD Seal: High grade FDA approved silicone
 - 6) Push lock barb connection
 - e. Stainless steel spring wire guard secured to fittings at each end.
5. **Detachable Dog Flex Hose**
- Provide kennel/pen manifold water supply hose assembly that can be detached from the room piping for sanitization or during periods of non-use
- a. Tubing: Black PVDF (Kynar) (3/8 inch OD x ¼ inch ID, NSF standard 61, FDA Grade, chlorine tolerance of .5 to 50 ppm)
 - b. Hose Length: As shown on Drawings
 - c. Autoclavability: Maximum temperature of 250°F
 - d. Quick disconnect couplings - Universal Style
 - 1) QD plug on upper end
 - 2) QD socket on lower end
 - 3) 316 Grade stainless steel
 - 4) Electropolish both internally and externally and passivate to a finish of 32 RA or better on all machined water contact surfaces
 - 5) QD Seal: High grade FDA approved silicone
 - 6) Push lock barb connection
 - e. Stainless steel spring supports (3 inches long) both ends.
6. **Solenoid Flush Valve**
- Provide solenoid valve located downstream from the water supply rack connection points at the terminating end of each room distribution piping run for Room Distribution Flushing or in the flush drain header at each rack location for On-Line Rack Flushing.
- a. Body Material: Electro-polished 316 stainless steel
 - b. Input power: 24 VDC, 0.5 amp
 - c. Watertight junction box connection with screw connectors
 - d. Coil: Epoxy encapsulated one piece
 - e. Ports: 3/8 inch FPT
 - f. Diaphragm: Teflon
7. **Rack Flush Recoil Hose**

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

Provide animal rack flush hose/check valve/fitting assembly that connects the terminating point of the rack manifold to the drain header. QD plug on lower end of hose to plug into supply line/recoil hose QD socket when rack position is vacant.

- a. Tubing coil: Black PVDF (Kynar) (3/8 inch OD x ¼ inch ID, NSF standard 61, FDA grade, chlorine tolerance of .5 to 50 ppm)
- b. Extended Reach: Six feet
- c. Autoclavability: Maximum temperature of 250°F
- d. Hose Fittings
 - 1) Swivel nut with o-ring seal on upper end
 - 2) QD plug on lower end – Universal style
 - 3) 316 grade stainless steel - wetted parts
 - 4) Push lock barb connection
- e. Stainless steel spring supports (3 inches long) at both ends.
- f. Check Valve
 - 1) Polypropylene body
 - 2) EPDM O-ring seal
 - 3) Stainless steel spring

8. Capabilities and Features

- a. Provide stainless steel tubing and fittings to be passive in tap water, 10 ppm chlorinated water or 2.5 pH acidified water
 - 1) Pocket created by the QD port in the I/C Assembly to be less than 2-1/2 tubing diameters long to allow for water exchange during flushing and to minimize the opportunity for microbial growth

C. Execution

1. Perform installation with factory-certified technicians on the Clean Fitting system or prequalify and train on-site technicians with factory-authorized personnel. Instruct on all aspects of cutting tube, deburring, tube bending and Clean Fitting assembly.
2. Fabrication
 - a. Factory deburr ends of cut tubing so it is ready to assemble into the Clean Fitting
 - b. Make field cuts with a stainless steel tubing cutter supplied by the system manufacturer and used only on stainless steel.
 - c. Chamfer outside and inside edges per assembly instructions 4230-MI4160 to remove any burrs.
 - d. Make square cuts to accurate lengths and assemble joints tightly.

<Insert A/E Name>
AE Project #: <Insert Project Number>

Animal Watering System
UH Master: 08.2023

22 8000 - 7

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- e. Use tube bending whenever possible for corners and offsets with a bender supplied by system manufacturer and used only on stainless steel.
3. Installation and Mounting
 - a. Attach tubing to the wall, ceilings or other suitable support structure with 18-gauge stainless steel clamps and other appropriate brackets. Use stainless steel mounting hardware.
 - b. Provide a 2-hole clamp at each I/C station within 2" of the QD fitting to provide adequate rigidity and support. Provide one-hole clamps at all other mounting points where suitable support can be attained. Space clamps not to exceed 36 inches.
 - c. Provide plastic stand-off spacers under each clamp for wall mounting applications to mount piping ½ inch off the wall with plastic screw anchors and stainless steel self tap screws (#10 x 1-1/4 inch).
 - d. Install the entire piping system at a consistent level throughout at a height of 84 inches to 96 inches above the floor. Limit any rises and drops.
 - e. Provide a stainless steel wall plate on each side of the wall for wall break penetrations. Use silicone sealant to affix the plate to the wall and to make an airtight seal around the pipe. Avoid any mechanical joints inside walls. Do not use wall sleeves.

2.3 PRESSURE REDUCING STATION

A. General

Provide a Pressure Reducing Station to supply animal drinking water at a normal operating pressure of 3 to 4 +/- 1/2 psi with a minimum flow of one gallon per minute.

1. Model 8550 digital display station with auto flush and monitoring sensors.

B. Parts

1. Enclosure/Panel

Construct all parts of 18-gauge 300 Series Stainless Steel, except back panel of 16-gauge, with commercial satin finish on all exposed surfaces. Provide two gasketed doors with stainless hinges at each side to swing open and provide full access to all components.

- a. Surface Mount Cabinet: 16 inches H x 25.5 inches W x 6.5 inches D
- b. Recessed Back Box: 16 inches H x 25 inches W x 6 inches D
- c. Recessed Door Frame: 17.5 inches H x 26.5 inches W

2. Display/Interface Module

Provide door-mounted display with digital readout of system pressure and LED Indicators for function status.

- a. Enclosure- ABS plastic, water resistant

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- b. 3-Character Display with pressure reading in psi, kPa/bar
 - c. Signal outputs for digital or network system connections
 - d. Output: 24vdc to solenoid valve
 - e. Inputs: Pressure transducer, flow switch
 - f. LED Indicators: High and low pressure, flow, solenoid power and service
 - g. Plug-in cable connectors
3. Wetted Components
- a. Piping, Fittings, Valves, etc.
 - 1) Piping: ½ inch O.D. Tubing- 316L Stainless Steel
 - 2) Fittings: Thread/Clean Joint Compression- 316L Stainless Steel
 - 3) Shut-off Valve: Ball Valve- 316 Stainless Steel
 - 4) Flexible Hose: Silicone Hose reinforced with polyester braid
 - 5) Inlet Connection: Clean Joint Fitting- ½ inch Tube x ½ inch MPT
 - 6) Outlet Connection: Flexible Hose with Clean Joint Fitting for ½ inch Tube
 - b. Water Filter- 5 inch housing standard
 - 1) Housing: Polypropylene with 3/8 inch FPT ports
 - 2) Replacement Cartridge: 5 micron spun polypropylene
 - 3) Flow Rate: 5 GPM at 50 psi
 - 4) Screen: 50 mesh Stainless Steel (Unfiltered models only)
 - c. Pressure Regulator- High flow design
 - 1) Materials- wetted parts
 - a) 316 Stainless Steel
 - b) Diaphragm: Silicone, 6 inch diameter
 - c) Seat: Silicone
 - 2) Ports: ½ inch MPT inlet, ¾ inch MPT outlet
 - 3) Pressure capacity: 75 psi (max) inlet
 - 4) Low Pressure Unit:
 - a) Range: 2-8 psi adjustable outlet
 - b) Standard setting: 3 psi
 - c) Flow rate: 10 GPM @ 3 psi setting
 - 5) High Pressure Unit
 - a) Range: 4-17 psi adjustable outlet

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- b) Standard setting: 15 psi
- c) Flow rate: 14 GPM @ 10 psi setting
- d. Pressure Transducer (CE Approved)
 - 1) Range: 0-25 psi (0.5% accuracy)
 - 2) 316 Stainless Steel wetted parts
- e. Flow Switch - Non-Adjustable (UL Recognized)
 - 1) Wetted materials: Ryton-R4 and 316 Stainless Steel
 - 2) Flow rate actuation of Switch: 80 +/- 20ml/min.
 - 3) Switch Function: N.O. (normally open with no flow)
 - 4) Switch Rating: SPST .17 amp at 120 Volts AC
- f. Solenoid Valve - Normally closed (UL Listed)
 - 1) Wetted Materials: Electro-polished 316 Stainless Steel Body:
 - 2) Ports: 3/8" FPT
 - 3) Coil: Epoxy encapsulated one piece 24 vdc, .5 amps

2.4 RECOIL HOSE FLUSH STATION

A. General

Provide a wall-mounted, self-contained Recoil Hose Flush Station that is designed to internally flush up to six Detachable Recoil Hoses at one time with water and then evacuate the hoses with compressed air.

[SELECT MODEL FOR PROJECT]

- 1. **[Model 2450 - Manual Flush Station (P/N 7300-2450-201) with stainless steel ball valves]**
- 2. **{Model 5480 – Automated Flush Station (P/N 7300-5480-301) with GP Controller and stainless steel solenoid valves}**
- 3. Approximate overall dimensions: 35 inches high x 25 inches wide x 6-1/2 inches deep

B. Operation

- 1. Operating Parameters
 - a. Water Supply Pressure: 40-60 psi/75 psi maximum
 - b. Water Supply Flow: 4 gpm minimum
 - c. Compressed Air: Clean, oil free
 - d. Compressed Air Pressure: 15-60 psi/75 psi maximum

<Insert A/E Name>
AE Project #: <Insert Project Number>

Animal Watering System
UH Master: 08.2023

22 8000 - 10

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

e. Compressed Air Flow: 10 cfm (cubic feet per minute)

C. Parts

1. Panel

- a. Size: Approximately 35 inches H x 25 inches W
- b. Material: 300 series 18-gauge stainless steel with pre-punched holes for mounting screws.

2. Wetted Components

- a. Piping: ½ inch OD Tubing - 316SS
- b. Fittings: Thread/Compression Type 316SS
- c. Check Valves (air and water inlet)
 - 1) Model 2450: 316 Stainless Steel
 - 2) Model 5480: 316 Stainless Steel
- d. Quick Disconnects:
 - 1) Material: 316 Stainless steel (wetted parts only)
 - 2) Style: Universal with ball check in QD plug
- e. Valves:
 - 1) Model 2450: Manually operated Stainless Steel- 90 degree turn ball type.
 - 2) Model 5480: Solenoid operated Stainless Steel 115 VAC 50/60 Hz normally closed pilot-operated type.
- f. Plumbing Connections:
 - 1) Water/Air Inlet: Flange with swivel nut for ½ inch MPT adaptor
 - 2) Drain: ½ inch OD 316 Stainless Steel Compression fitting with 15 feet of drain piping.

3. Control Panel (Model 5480 only)

- a. Enclosure: Nema 12, 10-1/2 inches H x 8-1/2 inches W x 5 inches D - 304 Stainless Steel
- b. Electrical Requirements: 115 VAC, 50/60 Hz, single phase, 1 amp with ground fault interrupter (GFI circuit) required, hard-wired
- c. GP Controller Features
 - 1) Start and Reset Buttons
 - 2) 32-character Liquid Crystal Display (LCD)
 - 3) Power and Alarm indicator lights
 - 4) Audible Alarm with Silence Button
 - 5) Keypad with dome switches

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

6) Selectable 2-cycle and 4-cycle flush modes

7) Cycle settings:

Flush 1: preset to 2 min, range 1-9 min

Soak (4-cycle only): preset to 30 min, range 1-99 min

Flush 2 (4-cycle only): preset to 2 min, range 1-9 min

Air Evacuate: preset to 15 sec, range 1-99 sec

2.5 CHLORI-FLUSH STATION

A. General

Provide a self-contained, UL-listed, wall-mounted Chlори-Flush Station that supplies chlorinated water at an operating pressure of approximately 17 psi for flushing and sanitizing mobile rack manifolds.

Include a metering pump, a four-gallon tank, a flow switch, an inlet water filter/mixing tube, pressure regulator, wall mount hardware, a poly recoil hose with quick disconnect on the outlet side for connection to the mobile rack watering manifold and a solenoid valve and GP Controller for either 1-cycle or 3-cycle operation.

1. Model 2494 - Automated Flush Station with stainless steel solenoid valve and GP Controller, for tapwater or purified water supply (P/N 7310-2494-305)
2. Approximate overall dimensions: 40 inches high by 37 inches wide by 10 inches deep.

B. Operation

1. Operating Parameters

- a. Water Supply Pressure: 25 psi minimum/75 psi maximum
- b. Water Supply Flow: 2 gpm minimum
- c. Water Supply Temperature: 40-120°F (4 - 49°C)
- d. Flush Station Output Pressure: 15-17 psi
- e. Flush Station Output Flow: 0.25 gpm minimum, 1.0 gpm typical
- f. Chlorine Concentration: 20 ppm recommended, adjustable
- g. Flush Cycles per tank: One full tank to treat approximately 720 gallons of water at 20 ppm or 1300 gallons at 10 ppm. This equates to 180-480 manifold flush cycles depending on flush time and flow rate.

C. Parts

1. Panel

- a. Size: Approximately 23.5 inches H x 35 inches W
- b. Material: 300 series 18-gauge stainless steel with pre-punched holes for mounting screws.

2. Piping, Fittings, Valves, etc.

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- a. Piping: ½ inch OD Tubing - 316SS
 - b. Fittings: Thread/Compression Type - 316SS
 - c. Valves: Solenoid operated Stainless Steel 115 VAC 50/60 Hz normally closed, pilot-operated type and stainless steel ball type.
 - d. Check Valves: 316 Stainless Steel
 - e. Inlet Connection: Flange with swivel nut for 1/2 MPT adaptor
3. Flow Switch
 - a. Activation Flow Rate: 0.25 gallons/minute minimum
 - b. Construction: PVC with hermetically sealed switches
 - c. Electrical Rating: 115 Volts AC, 50/60 Hz (.50 amps maximum), normally closed
 4. Mixing Chamber:
 - a. Construction: Polypropylene with 3/8 NPT ports
 - b. Mixing Tube: PCV pipe
 5. Chlorine Injection Pump/Tank
 - a. Construction: Glass fiber reinforced thermoplastic. All exposed fasteners to be stainless steel.
 - b. Flow Rate: Maximum capacity 31 ml/minute, maximum pressure 100 psi
 - c. Electrical Rating: 115 volts AC, 50/60 Hz. Ave. input power is 130 watts @ maximum speed
 - d. Suction and Injection: Provide a foot valve with integral strainer for the suction line. Include an anti-siphon check valve with 1/2" NPT male connection at the injection point.
 - e. Solution Tank: Polyethylene, four gallon capacity, 12 inches x 6 inches x 12 inches
 6. Pressure Regulator:
 - a. Construction: 316 Stainless steel wetted parts
 - b. Ports: ½ inch MPT inlet, 3/8 inch MPT outlet
 - c. Pressure Capacity: 75 psi maximum inlet, 17 psi outlet
 - d. Flow at 17 psi - 13 gpm
 7. Recoil Hose Assembly:
 - a. Hose Material: Polyurethane, 3/8 inch O.D. by ¼ inch ID, black, FDA Grade
 - b. Hose Reach: 10 feet
 - c. Quick Disconnect: Universal Style stainless steel socket
 8. Control Panel

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- a. Enclosure: NEMA 12, 10 inches x 8 inches x 6 inches. 304 Stainless Steel.
- b. Electrical Requirements: 115 volts AC, 50/60 Hz, single phase, 1 amp with ground fault interrupter (GFI circuit) required, hard wired
- c. Controls:
 - 1) Manual: Selector Switch for Chlorinated Water or Plain Water
 - 2) Automatic: GP Controller features
 - a) Start and Reset Buttons
 - b) 32-Character Liquid Crystal Display (LCD)
 - c) Power and Alarm indicator lights
 - d) Audible Alarm with Silence Button
 - e) Keypad with dome switches
 - f) Selectable 1-cycle and 3-cycle flush modes
 - g) Cycle settings
 - Flush 1: preset to 2 min, range 1-9 min
 - Soak (3-cycle only): preset to 30 min, range 1-99 min
 - Flush 2 (3-cycle only): preset to 2 min, range 1-9 min

2.6 CHLORINE INJECTOR STATION

A. General

Provide a self-contained, UL-listed, wall-mounted Chlorine Injector Station that supplies chlorinated water for the Recoil Hose Flush Station and other applications where the water flow rate is constant.

Include a metering pump, a four-gallon tank, a flow switch, a mixing chamber, electrical controls and wall mounting hardware. All components shall be compatible with either tap water or purified water supply.

[SELECT MODEL FOR PROJECT]

1. **[Chlorine Injection Station for stand alone operation (P/N: 7130-6574-301)]**
2. **[Chlorine Injection Station for use only with Auto Recoil Hose Flush Station (P/N 7300-5480-301) with a GP Controller to provide control functions (P/N 7130-6574-302)]**
3. Approximate overall dimensions: 38 inches H by 35 inches W by 10 inches D.

B. Operation

1. Operating Parameters
 - a. Water Supply Pressure:
 - 1) 75 psi maximum
 - 2) Recoil Hose Flushing - 40-60 psi

<Insert A/E Name>
AE Project #: <Insert Project Number>

Animal Watering System
UH Master: 08.2023

22 8000 - 14

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- b. Water Supply Flow:
 - 1) 0.25 gpm minimum
 - 2) Recoil Hose Flushing - 4 gpm minimum
 - 3) Water Supply Temperature: 40-120°F
 - c. Chlorine Concentration: 2-20 ppm, adjustable ranges
 - d. Treatment capacity per tank: Half-full tank to treat approximately 1350 gallons of water at 20 ppm.
- C. Parts
1. Panel
 - a. Size: Approximately 23.5 inches H x 35 inches W
 - b. Material: 300 series 18-gauge stainless steel with pre-punched holes for mounting screws
 2. Piping, Fittings, Valves, etc.
 - a. Piping: ½ inch OD Tubing - 316SS
 - b. Fittings: Thread/Compression Type - 316SS
 - c. Ball Valve: 3/8 inch FPT - 316SS
 - d. Inlet Connection: Flange with swivel nut for ½ inch MPT adaptor
 - e. Outlet Connection: ½ inch OD compression fitting
 3. Flow Switch
 - a. Activation Flow Rate: 0.25 gallons/minute minimum
 - b. Construction: PVC with hermetically sealed switch
 - c. Electrical Rating: 120 Volts AC, 50/60 Hz (.5 amps maximum), normally closed.
 4. Mixing Chamber
 - a. Construction: Polypropylene with 3/8 inch NPT ports
 - b. Mixing Tube: PVC Pipe
 5. Chlorine Injection Pump/Tank
 - a. Construction: Glass fiber reinforced thermoplastic. All exposed fasteners to be stainless steel.
 - b. Flow Rate: Maximum capacity 26 ml/minute, maximum pressure 140 psi.
 - c. Electrical Rating: 120 volts AC, 50/60 Hz, average input power 168 watts @ maximum speed.
 - d. Suction and Injection: Provide a foot valve with integral strainer for the suction line. Provide an anti-siphon check valve with ½ inch NPT male connection at the injection point.

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- e. Solution Tank: Polyethylene, four-gallon, 12 inches x 6 inches x 12 inches
- 6. Control Panel - Model 301 only
 - a. Enclosure: NEMA 12, 10 inches x 8 inches x 6 inches. 304 Stainless Steel
 - b. Electrical Requirements: 120 Volts AC, 50/60 Hz, single phase, 1 amp with ground fault interrupter (GFI circuit) required, hard wired
 - c. Controls: Selector switch for chlorinated water or plain water
- 7. Junction Box - Model 302 only
 - a. Enclosure: Weatherproof 2-gang switch box. Aluminum
 - b. Electrical requirements: Powered from Edstrom GP Controller on Auto Recoil Hose Flush Station
 - c. Controls: Controlled by Edstrom GP Controller on Auto Recoil Hose Flush Station

2.7 AUTOMATED WATERING SYSTEM CONTROLLER

A. General

Provide an Automated Watering System Controller (AWSC) specifically designed for automated animal drinking water systems and cage pan and animal room trench flushing systems. The microprocessor-based control and monitoring system shall simultaneously flush and monitor animal drinking water systems and control trench and cage pan flushing.

B. Parts

1. Major System Components

a. Controller

Collect, process, store all data from sensors; store all configuration data, provide user interface to view status, activate controls, and change configuration of all animal drinking water system pressure reducing station sensors, bypass valves and flush valves.

1) Enclosure and display

- a) Surface mounted stainless steel enclosure (14 inches W x 16 inches H x 6 inches D)
- b) Recessed stainless steel back box and Flush Mount Panel (16 inches W x 20 inches H x 6 inches D)
- c) 40x2 character liquid crystal display
- d) 16 keys keypad, all poly dome switches
- e) Input power: 24vac, 1 and 3 amp fused inputs

2) Processor and communications

- a) 16-bit microprocessor with communications coprocessor

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- b) Non-volatile user program memory
 - c) (64) 24vdc, 0.5amp outputs, fused in banks of 16 to control solenoid valves
 - d) One network input to monitor up to 32 pressure reducing stations for pressure and leak
 - e) Auxiliary form C dry remote alarm contact
 - f) RS-232 printer interface
 - g) Audible alarm
 - h) Alarm, service, power LED indicators
- 3) Connections and cable
- a) Connection to solenoid valves via two conductor, 18-gauge shielded cable
 - b) Connection to pressure reducing station interface board via 22-gauge twisted pair network communication cable
 - c) Plug-in screw connectors requiring no tools for disassembly
- b. Power supply to controller, interface modules and solenoid valves.
- 1) Surface-mounted enclosure
 - a) NEMA 12 painted steel (8 inches W x 10 inches H x 6 inches D)
 - 2) Power input and output
 - a) Input power: 120vac 3 amp fused
 - b) Output power: 24vac 10 amp fused
 - c) Plug in screw connectors requiring no tools for disassembly
 - d) Power on LED indicator
- c. Pressure Reducing Station Interface MODULE to provide interface from network communications cable to pressure station monitoring sensors and power connection to solenoid valve
- 1) Enclosure
 - a) ABS plastic, water-resistant
 - 2) Processor and Communications
 - a) 8-bit microprocessor
 - b) Output: 24vdc to solenoid valve
 - c) Inputs: high pressure switch, low pressure switch, flow switch
 - d) LED indicator lights: high and low pressure, flow switch, power and service
 - e) Plug-in screw connectors requiring no tools for disassembly

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- d. Remote printer
 - 1) HP color inkjet
 - 2) Serial to parallel converters with appropriate line drivers
- e. Speech/Modem alarm notification and dial-in device
 - 1) 33.6 or better modem with voice mail
- 2. Monitoring devices
 - a. Pressure Switch-Monitor animal watering system pressure-reducing station for high and low water pressure
 - 1) Materials and ratings
 - a) Wetted materials: 17.7 PH series stainless steel
 - b) Low pressure setting: 1.25 PSI +/- 1/4 PSI
 - c) High pressure setting 7.25 PSI +/- 1/4 PSI
 - d) Contacts open when system pressure between low and high settings
 - e) Rating: SPDT 10 amp at 120 vac
 - 2) Flow Switch-Monitor animal watering system for water flow
 - a) Materials and ratings
 - (1) Wetted materials: polysulfone and 300 series stainless steel
 - (2) Flow rate actuation: 80 ml/min +/- 20 ml/min
 - (3) Rating: normally open SPST 0.17 amp at 120 vac
- 3. Control devices
 - a. Solenoid Valve-Provide bypass to high pressure regulator in pressure-reducing station, open to flush watering room distribution systems, individual cage rack flushing systems, trench or cage pan flushing systems
 - 1) Pressure reducing station bypass, room distribution and cage rack flush valves
 - a) Body material: 316 stainless steel
 - b) Input power: 24 vdc 0.5 amp
 - c) Watertight junction box connector with spade or screw connectors
 - d) Coil: epoxy encapsulated one piece
 - e) Ports: 3/8 inch FPT
 - f) Diaphragm: Buna - N
 - 2) Trench and cage pan flush valves
 - a) Wetted material: brass
 - b) Input power: 24 vdc 0.5 amp

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- c) Watertight junction box connector with spade or screw connectors
 - d) Coil: epoxy encapsulated one piece
 - e) Ports: to match inlet pipe size
 - f) Diaphragm: Buna - N
4. Capabilities and features
- a. Automated Monitoring and Control of Animal Drinking Water Systems
 - (1) Open sequentially and in combination, pressure-reducing station bypass and terminal or individual cage rack solenoid flush valves
 - (2) Allow flushing at only one point at a time
 - (3) Delay closure of terminal flush solenoid valve allowing system to return to normal operating pressure
 - (4) Control system flushing with user defined start times entered at the controller user interface
 - (5) Control flushing of an individual room or cage rack flush solenoid valve at the controller after entering a valid PIN
 - (6) Report and store events at the controller verifying a successful flushing sequence based on data from pressure reducing station pressure and flow sensors
 - (7) Begin alarm notification process when pressure reducing station pressure and flow sensors indicate a flush sequence has failed, or when a high or low pressure or leak condition is sensed
 - b. Automated Flushing of Animal Room Trenches and Cage Pans
 - 1) Open sequentially trench or cage pan solenoid flush valves
 - 2) Allow flushing at only one point at a time
 - 3) Control system flushing with user defined interval times entered at the controller user interface
 - 4) Control flushing of an individual trench flush or cage pan flush solenoid valve at the controller after entering a valid PIN
 - c. Alarm Notification
 - 1) Activate remote alarm contact during alarm condition
 - 2) Activate controller alarm LED indicator during alarm condition
 - 3) Display alarm condition in status screen, showing location and nature of the alarm
 - 4) Activate audible alarm during alarm condition until silence button is pushed

University of Houston Master Specification

<Insert Project Name>
<Insert U of H Proj #>

<Insert Issue Name>
<Insert Issue Date>

- d. Data Storage
 - 1) Store all system activity data, including alarm information, flush start and end data, user activity and alarm acknowledge activity in nonvolatile memory
 - 2) Store all configuration data in nonvolatile memory
- e. Data Reporting
 - 1) Provide printed reports for a user-defined date range including all activities and alarm information including date, time and location
- f. User Interface
 - 1) Provide complete and self-contained user interface at the controller requiring no additional input devices such as an external computer or replacement of programmed microchips to modify system setup or configuration
 - 2) Provide status screens to display time, date, system status and current alarm conditions
 - 3) Provide activate screens to allow the user, after entry of a valid PIN, to activate a flush sequence, flush an individual flush valve, pulse an individual flush valve or activate high pressure at a pressure-reducing station and acknowledge alarms
 - 4) Provide configure screens to allow user, after entry of a valid PIN and passcode, to add a PIN, delete a PIN, change date and time, activate audible alarm, set sequence times, set flush length, set alarm delays
 - 5) Provide install screens to allow user, after entry of a valid PIN and passcode, to add new monitoring and control devices to the system
 - 6) Provide plain English messages and user defined labels for all control and monitoring devices

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine and verify that surfaces of the structure to receive the animal watering system have no defects or errors that would result in poor or potentially defective application or cause latent defects in workmanship.
- B. Report any unsatisfactory conditions to the Architect and Owner.
- C. Starting installation shall imply acceptance of surfaces.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's latest published requirements, specifications, details and approved submittals.

University of Houston Master Specification

<Insert Project Name>

<Insert U of H Proj #>

<Insert Issue Name>

<Insert Issue Date>

3.3 ADJUSTING

- A. Provide an adequate number of service representatives (minimum of one full time) for the four-week period immediately prior to the occupancy of the facility to adjust and repair any part of the equipment and to ensure proper start-up, smooth operation and correction of any mechanical failure.
- B. The names, addresses and telephone numbers, including both office and mobile numbers, of the service representatives assigned to the installation shall be provided at the onset of the specified period.

3.4 DEMONSTRATION

- A. Start-Up Assistance: Owner will designate one member of the Owner's staff to accompany the service representatives described in 3.3 above.
- B. Operational and Maintenance Training:
 - 1. Provide instruction by factory-trained and certified personnel for a minimum of six of the Owner's personnel for a period of not less than 40 hours. The training shall be given at a location designated by the Owner, in addition to any necessary on-site orientation and training.
 - 2. Provide bound copies of training materials for each attendee plus additional copies as required by the project close-out. Contractor shall submit a training proposal, including program materials, instructors' qualifications and proposed schedule, a minimum of 60 days prior to the training session.
 - 3. Owner reserves the right of approval of any training course, material, instructor and schedule.

END OF SECTION 22 8000