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DETAILED EQUIPMENT SPECIFICATION

MDAS SERIES DEALKALIZERS

1.0 SCOPE

- 1.1 Provide as indicated a factory assembled vertical pressure type chloride cycle dealkalizer system shipped with manifold piping attached to the resin tank for ease of installation and start up. The system shall be of an approved design as fabricated by a manufacturer regularly engaged in the production of water treatment equipment. All equipment and material shall be supplied in compliance with the specifications as intended for a complete and operational system.
- 1.2 Qualified manufacturers of water treatment equipment of the type specified are Marlo, Inc. or engineer's approval equal.

2.0 GENERAL DESCRIPTION

- 2.1 The system, in compliance with equipment specifications, is described as an automatic **(single) (parallel twin) (alternating twin) (parallel triple) (alternating triple)** water dealkalizer system meeting the performance and design data requirements as hereinafter specified.
- 2.2 The system specifications are based on Marlo Model MDAS-_____.

3.0 PERFORMANCE & DESIGN DATA

3.1 INFLUENT WATER ANALYSIS

Total Hardness _____ grain/gal (ppm) as CaCO₃ (soft water feed required)
 Total Alkalinity _____ grain/gal (ppm) as CaCO₃
 Total Sulfate _____ grain/gal (ppm) as CaCO₃
 Total Nitrate _____ grain/gal (ppm) as CaCO₃
 Total Chloride _____ grain/gal (ppm) as CaCO₃
 Total Dissolved Solids (TDS) _____ grain/gal (ppm) as CaCO₃
 pH _____

3.2 EFFLUENT WATER QUALITY 90% Alkalinity Reduction

3.3 DESIGN PARAMETERS

Continuous System Flow & Pressure Drop	_____ GPM @ _____ psi
Peak System Flow & Pressure Drop	_____ GPM @ _____ psi
Daily Water Usage	_____ Gallons/Day
Daily Hours of Water Demand	_____ Hours/Day
Operating Temperature Range	_____ °F Maximum
Operating Pressure Range (System)	_____ PSIG
Electrical Requirements	_____ V _____ Hz

3.3 EQUIPMENT SCHEDULE

Resin Tanks	Qty. _____	Dia. _____ in.	SideShell _____ in.
Service Valves	Size ____ in.	Type _____.	
Exchange Resin	Qty. _____	cu. ft.	
Brine Maker	Qty. _____	Dia. _____ in.	Height _____ in.
Salt Storage	_____	lbs.	
Regeneration Type	(Time clock) (Metered)		
Water Meter (s)	Qty _____	Size _____ in.	Type _____.

4.0 EQUIPMENT

4.1 Tank

Dealkalizer tank(s) shall be of welded construction of tank-quality carbon steel. The tank(s) shall have threaded openings for pipe connections and an 11" x 15" manhole in the top head (for tanks 30" diameter and smaller; two 4" x 6" handholes shall be provided in the top head and lower side shell). The tank(s) shall be rated for 100 psig working pressure and 150 psig test pressure. Support legs shall be the strap-type permanently welded to the lower tank head. The tank(s) shall be provided with a cold-set epoxy internal lining with a minimum of 10 – 12 mils DFT and a rust resistant prime coat external coating 2 – 3 mils DFT.. A minimum freeboard of 50% shall be provided for backwash expansion above the normal ion exchange resin bed level.

4.2 Tank Option

Provide pressure vessel in accordance with ASME Section VIII. Working pressure to be 100, 125 or 150 pounds, hydrotested to 1.3 times the working pressure, and stamped and certified.

4.3 Tank Option

Provide safety blue epoxy finish paint 6 – 8 mils DFT over exterior tank and valve surfaces.

4.4 Upper Distributor

The upper distribution system shall be a single point baffle constructed of Schedule-40 galvanized steel pipe and fittings.

4.5 Lower Distributor

The lower distributor system shall be of the hub and radial type design, constructed of PVC with slotted full flow non-clogging replaceable ABS strainers and covered with a subfill of 1/8" x 1/16" washed gravel.

4.6 Main Operating Valves

The main operating valves shall be a nest of individual diaphragm valves. The valves shall have cast iron bodies, Buna-N diaphragm and stainless steel and brass internal parts. The valves shall be slow opening and closing, and free of water hammer. There shall be no contact of dissimilar metals within the valves and no special tools shall be required to services the valves. Valves can be operated either hydraulically or pneumatically.

4.7 Flow Control

An automatic backwash control shall be provided to maintain a proper backwash and fast flush flows over wide variations of operating pressure. Controller shall contain no moving parts, and require no filed adjustment.

4.8 Piping and Fittings

The main operating valves and manifold piping shall be factory assembled and shipped attached to the resin tank for ease of installation and start-up. Piping shall be Scheduled 40 galvanized steel. Galvanized fittings shall be standard Class 150 threaded malleable cast iron.

4.9 Exchange Resin

The ion exchange resin shall be virgin high capacity strongly basic, anion type stable over the entire pH range with high regeneration efficiency and low susceptibility to organic fouling.

Each cubic foot of resin shall be capable of removing 10,000 grains of total exchangeable anions as calcium carbonate when regenerated with 5 lbs. of salt and 0.33 lbs. of caustic.

4.10 Control System

A NEMA 12 rated, factory mounted and wired electrical enclosure with all timing and sequencing controls for each dealkalizer shall be manufactured and provided by the same vendor providing the water treatment hardware.

The controls shall include an automatic regeneration timer having the capability of providing site adjustable regeneration steps of backwash, brine injection, brine displacement, flush and return to service. Indicator lights on the panel door shall display the current status of the system.

A multi-ported pilot control stager shall be factory wired and pre-tubed to automatically pressure activate the main operating valves through the steps of regeneration. An indicator on the stager indicates the cycle of operation at all times. Complete function and control of all regeneration steps can be performed manually in the event of a power failure.

5.0 REGENERATION SYSTEM

5.1 Provide a complete regeneration system including all control valves, injector assemblies, combination brine measuring and salt storage tank, caustic feed system and controls as hereinafter specified for operation with the dealkalizer equipment.

5.2 Provide a single brine measuring and dry salt storage tank with salt platform. Size tank for at least four (4) regenerations at full salting. Brine dosage shall be adjusted in the field without piping revision.

Brine tank with cover, shall be rotationally molded of polyethylene, be free of seams and have a wall thickness of 3/8". The brine tank shall be equipped with a float operated, plastic fitted, field serviceable brine valve for automatic control of brine withdrawal and fresh water refill. The brine valve shall provide positive shut-off to prevent air from entering the system. High purity evaporated pellet type or solar salt is recommended.

5.3 Provide an automatic chemical feed system to inject a small amount of caustic into the diluted brine solution during the brine draw period. Caustic assisted regeneration will remove carbon dioxide from the water and maximize capacity. The system shall consist of a caustic pump, portable pump stand, foot valve, suction and discharge tubing and controls.

The caustic pump shall be a positive displacement diaphragm metering pump that is infinitely adjustable from 0 to 100% of the capacity range. Ball check valves on the suction and discharge will insure metering accuracy. The pump motor shall operate on 120 volt, 60 Hz, single phase electrical power.

6.0 REGENERATION INITIATION OPTIONS (Choose One)

6.1 Time Clock

The 12-Day electrical time clock controller shall be fully adjustable to initiate regeneration at any hour of the day and any day of the week.

6.2 MF-ET Automatic Reset Meter (Single Tank)

The dealkalizer shall be equipped with a single, impeller type water meter in the outlet piping. When the user specified volume is reached, the meter register will send a 120 volt signal to the control system that will direct the dealkalizer to begin regeneration immediately or delayed to a user set time.

Meter register shall be mounted in a NEMA-3R environmental enclosure and have digital display of continuous flow rate and volume totalization.

6.3 MF-ET Automatic Reset Meter (Twin Alternating)

The twin dealkalizer shall be equipped with a single, impeller type water meter in the common outlet header. When the user specified volume is reached, the meter register will send a 120 volt signal to an alternator stager that will direct the dealkalizer presently on-line to begin regeneration immediately while placing the stand-by dealkalizer into service mode. System shall produce a continuous supply of soft water.

Meter register shall be mounted in a NEMA-3R environmental enclosure and have digital display of continuous flow rate and volume totalization.

6.4 MX Electronic Programmable Controller

The system shall consist of **(two) or (three)** media tanks each having a dedicated paddle wheel type flow sensor in the dealkalizer outlet piping and operate in either of these user selected modes:

- Alternating – One (1) tank will be in standby or regeneration and **one (1) or two (2)** media tanks will be on-line. At a user-specified volume the standby tank will go on-line and the exhausted tank will go into regeneration. After regeneration this tank will go into standby until its rotation to go back on-line.
- Parallel-All tanks are on-line simultaneously. As each media tank's user specified volume is reached it shall immediately be taken off-line, regenerated and placed immediately back on-line.
- Additive Flow-One (1) tank, designated as the primary, will remain on-line at all times. Variation of treated water flow demand shall automatically cause one additional media tank (up to two additional media tanks) to change status from standby to on-line and back to standby as needed. When the primary media tank regenerates, the next media tank in sequence shall become the primary.

As each tank user set volume is reached, it will immediately be taken off-line, regenerated and placed immediately back on-line or standby depending on treated water flow demand. The controller shall be capable of continuously determining the exhaustion rate of each media tank thus automatically avoiding the possibility of a simultaneous regeneration attempt. Simultaneous regenerations are not possible.

The exchange capacity of each dealkalizer can be the same or different. Flow rate or peak flow rate indication shall be continuously displayed for each unit. The continuous flow range is 0 – 999 flow units per minute (gallons, cu-ft., liters, cu-m, etc.). Cumulative volume totalization to eight (8) digits shall be continuously displayed for each unit.

7.0 SKID MOUNT, PREPIPE AND PREWIRE OPTION

The dealkalizer tanks shall be skid mounted on a structural carbon steel skid. The skid shall be cross-braced with channel or angle iron. All steel surfaces shall be finish coated to match exterior of dealkalizer tanks. All interconnecting piping shall be the same material as the valve nest manifold piping and shall be assembled by the manufacturer.

This shall included inlet and outlet bronze isolation valves for each tank and a bronze system bypass valve. Inlet, outlet and drain headers shall be provided and terminated at the skid edge. All piping shall be suitable supported by channel supports anchored to the skid. Electric wiring, where applicable, shall be complete between all inter unit controls and require only a single power source connection.

The inter unit wiring shall be contained in waterproof conduit. All inter-tank hydraulic or pneumatic tubing shall be installed as part of the skid package.

The dealkalizer tanks are to be bolted to the skid. Permanent attachment, or welding, will not be acceptable. The entire skid mounted system shall be leak and electrically tested as a unit by the manufacturer before shipment.

8.0 ACCESSORIES

- 8.1 Water test kits for hardness.
- 8.2 Water test kits for alkalinity.
- 8.3 Pressure Gauges for raw water inlet and treated water outlet
- 8.4 Sampling Cocks for raw water inlet and treated water outlet.

9.0 INSTRUCTIONS

A complete set of installation, operating and maintenance shall be provided.

10.0 FIELD SERVICE

The services of a factory authorized service representative shall be made available to supervise, inspect and provide operator training as required for initial start-up and system operation.

11.0 GUARANTEES

Attrition loss of mineral is guaranteed not to exceed 3% per year for a period of three (3) years.

All mechanical and electrical equipment is guaranteed for one (1) year against any defects in workmanship or materials. Any part proving defective shall be replaced or repaired within this period at manufacturer's option.

The manufacturer guarantees that under actual operating conditions the resin shall not be washed out of the system during the service run or backwashing period; and that the turbidity and color of the effluent, by reason of passing through the dealkalizer system, shall not be greater than the incoming water; and that the underdrain system, gravel and minerals shall not become fouled, either with turbidity or by dirt, rust or scale from the dealkalizer system while operating as noted in manufacturer's instructions.