Specification

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Emergency Shut Off System Series CR-1Y (Hexacon) - Model II for Chlorine Cylinder and Ton Container Automatic Switchover Systems

1. Scope

This specification describes the Series CR-1Y Emergency Shut off System as manufactured by Halogen Valve Systems, Inc. for Chlorine Cylinder and Ton container valves. These systems are designed for installation in conjunction with automatic switch over systems (provided by others) that employ up to six chlorine containers providing an uninterrupted flow of chlorine.

2. Description

The emergency shut off system shall be the Halogen Series CR-1-Y comprised of up to six (6) electrically driven Actuators that act directly upon the cylinder or ton container valve stem. The Actuators shall mount upon the cylinder or ton container valve and yoke assemblies by means of a clamping mechanism and a valve stem coupling so as to be removable during cylinder changes.

The Actuator shall deliver 50 ft.-lbs. of closing torque to the valve stem upon receipt of an emergency shutdown signal. The Actuator shall be powered only in the closing direction with provision for manual override in either the open or closed direction. Power for the Actuator shall be supplied by an uninterruptable 12V battery power supply and control system. For test closing, the Actuator shall deliver 30 ft.-lbs of torque.

3. Actuator Design

Each Actuator shaft shall couple to the valve stem and provide an extension through the Actuator such that a standard chlorine wrench may be applied to the extension to manually operate the valve while the actuator is in place. The extension shaft shall be coupled to the drive motor and reduction gearing by means of a one way, positive engagement clutch that may be selectively disengaged for manual operation. Pushing in on the shaft shall disengage the clutch for manual operation of the valve. The clutch shall have a toggle mechanism such that it remains disengaged, free to rotate in either direction, for manual operation. The clutch shall automatically reengage, for automatic closure upon activation of the motor and gear train.

4. Actuator Components

4.1 Motor Driver

Motive power for the Actuators shall be provided by 12V dc electric motors acting through a gear reduction system.

4.2 Clutch & Shaft

The Actuator shall be constructed of materials suitable for the chlorine environment. The valve stem extension shaft shall be machined from a single piece of Monel. The valve stem connection coupling and shaft bearing/seal shall be of Aluminum-Silicon Bronze, C-642 Teflon coated for additional corrosion resistance. The valve stem engagement spring shall be of heat treated Hastelloy C-276.

4.3 Valve Stem Coupling

The element that couples the driven shaft to the valve stem shall be designed to accommodate slight misalignment of the Actuator shaft with the axis of the valve stem without restricting rotation.

4.4 Clamp/Frame

The clamping mechanism for yoke mounting (Series CR-1-Y) shall require no tools for installation on the valve and valve yoke.

Adapters shall be available to unitize the Actuator with regulator clamping systems commonly used in the industry. Regulator mounting shall require only an adjustable wrench for mating to the regulator. The regulator manufacturer is to be specified.

All clamp and frame components shall be coated with fusion bonded polyester for corrosion resistance.

4.5 Sealing Devices

Shaft entrances to the Actuator mechanism shall be sealed with double "O" ring seals of Viton and/or Teflon. The motor canister and main enclosure will be sealed with static, Viton "O" ring seals.

5. Control Panel Design

The Hexacon Controller shall be contained within a single electrical enclosure of NEMA 4X rating. All cables, connectors, switches and fittings shall be of a similar rating to resist the chemical environment. The actuators shall have a dedicated power source (battery) and microprocessor controller. Electrical power shall be delivered to each Actuator by means of a flexible cable. The control panel shall have indicator lights to display the status of key system elements. The control panel shall accept signals from sources such as gas detectors, remote station alarms, seismic or fire sensors and manual switches to trigger the Actuator or Actuators to sequentially close all of the cylinder or ton container valves connected to the system. The panel shall have the capability of accepting input signals to initiate either simultaneous or independent operation of each Actuator and valve.

6. Control Panel Components

6.1 Control Circuitry

An electronic circuit board in the control panel shall contain a microprocessor programmed to precisely control the valve closing cycle and the torque applied to the valve stem. The microprocessor shall also monitor and display status of the battery, charging power as well as provide a diagnostic system to check comprehensive system readiness. Electro-mechanical relays or contacts, which are susceptible to corrosion failure, shall not be used in the control circuitry. The entire control system shall be comprised of encapsulated solid state devices.

In the event of a sustained loss of charging power (two to three days), the microprocessor shall detect a declining battery charge to initiate Actuator closure while sufficient power remains to apply the specified torque to the valve stem.

6.2 Battery and Charger

The battery shall be of the gel-cell lead-acid type rated at 7 ampere-hours. The charging system shall provide a variable controlled charge current that is temperature compensated to optimize battery performance and service life.

6.3 Status Lights

The control panel enclosure shall have a membrane panel in the front cover where the operator may observe the status lights. The status lights for each respective system are as follows:

1. **Charge OK**--(Normally On) Steady Green or **Charge OFF**--(Normally Off) Steady Red to indicate that charge power is or is not available.
2. **Armed/Ready** -- (Normally Pulsating) Green light indicates the microprocessor is functioning and ready to operate. Steady Green during operation and for a 15-second reset period after activation.
3. **Battery OK** -- (Normally On) Steady green or **Battery Low** -- (Normally Off) Steady red to indicate that the battery should be checked. Both “On” indicates battery 12.6 and 12.4 VDC.
4. **Fault Error** -- (Normally Off) Blinking red light will indicate a system malfunction code (1-9).

6.4 Input Signals

The control panel shall contain a DIN rail to accept multiple incoming signals for either simultaneous or individual Actuator operation. External signals shall consist of a "Normally Open or Normally Closed" dry contact, to initiate the Actuator.

6.5 Output Signal

After initiation of the Actuator, the control system shall provide a high voltage output signal (5.0-amp @ 115/230V dc/ac) and a low voltage output signal (0.2-amp @ 24V dc/ac) to indicate Actuator initiation and/or completion. These output signals may, in turn, be employed to trigger other relays or alarms.

6.6 Testing

An actuator **Test** button for each individual actuator is mounted externally on the control panel. When activated, it shall provide a 30 ft.-lbs. torque on a valve stem, self-test the microprocessor, check cable-motor continuity, and load-test the battery. Testing procedures as outlined on the control panel label shall provide the operator with "Go"-"No-Go" criteria. Test results shall be confirmed by operator’s observation and the tactile force required in re-opening the valve.

7. Power Requirements

The power supply to operate the control panel shall be (115 VAC, 60 Hz) single phase. Current consumption shall be 0.5 amps at 115VAC.

8. Optional Outputs

(1) A Fault Error Relay rated at 5.0-amp @ 115/230 VAC is available to indicate if either Low Battery and/or Fault Error Lights are activated. Relay output signal will remain activated until the negative condition is eliminated. (2) A RS232 serial output is available for computer monitoring.

9. Accessories

Standard accessories for each Actuator system shall include (1) Stowage bracket for temporary placement of the Actuator during cylinder and container changes. (2) A twisted chlorine cylinder type wrench.