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# Specification

## Emergency Shut Off System Series CR-1Y (Hexacon) - Model III 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

Emergency shut off system shall comply with all items listed in Chlorine Institute document, "Recommendations for emergency closure devices for container valves".

The emergency shut off system shall be the Halogen Series CR-1-Y comprised of one (1) electrically driven Eclipse actuator that acts directly upon the cylinder or ton container valve stem. The actuator shall mount upon the chlorine valve and yoke assemblies by means of a hand clamping mechanism and a valve stem coupling so as to be removable during a cylinder change. **No tools of any kind shall be required to install or remove the actuator.**

**The Eclipse controller shall measure and deliver 50 ft.-lbs. of closing torque by controlling the current flow to the actuator on the valve stem during an emergency shutdown.** The Eclipse actuator shall be powered only in the closing direction with provision for manual override in either the open or closing direction. Power for the actuator shall be supplied by an uninterruptable 12V battery power supply and controlling system. **The Eclipse actuator controller shall measure and deliver 30 ft.-lbs. of torque to the valve stem for test closing.**

### 3. Actuator Design

**When installed, the actuator shall not impede the operators' ability to manually operate the chlorine valve with a standard chlorine wrench. The design shall not impede the ability to access the valve packing nut and yoke/clamp in the event**

**they need to be tightened.** 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 Eclipse actuators shall be provided by 12V dc electric motors acting through a gear reduction system.

#### 4.2 Clutch & Shaft

The Eclipse 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.

## 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 Eclipse 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 system status lights and an informational OLED display to indicate the status of key system elements. The control panel shall accept signals from sources such as gas detectors, remote station alarms, fire sensors and manual switches to trigger the Eclipse actuator or actuators to sequentially close all of the cylinder or ton container valves connected to the system.

## 6. Control Panel Components

### 6.1 Control Circuitry

An electronic circuit board on the control board 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 diagnostic information to check comprehensive system readiness. The entire control system shall be comprised of solid state encapsulated devices not susceptible to corrosion.

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 8.5Ah, High Rate. The charging system shall provide a variable controlled charge current that is temperature compensated to optimize battery life.

### 6.3 System Status Display

The control panel enclosure shall have a membrane panel on the front cover where the operator may observe the status lights and OLED display.

1. **Armed / Ready**-(Normally On) Rapidly pulsating Green to indicate the microprocessor is functioning and ready to operate.

2. **System Status Lights** -Steady Green (Normally On) – OK, Steady Amber – Warning (Normally Off), and Steady Red (Normally Off) – Error. Amber and Red explained on OLED display.
3. **System Status Information** – The OLED display screen shall have two lines of twenty characters each. Display shall indicate the status of the Battery, Actuators, Microprocessor system, Fault Errors as well as other information as required.

## 6.4 Input Signals

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

## 6.5 Outputs – Two Terminals

After activation of the Eclipse actuator control system one low voltage output signal (0.2-amp @ 24V dc/ac) shall indicate, if actuator initiation and torque completion are accomplished. A second low voltage output will indicate a "Warning" or "Error" light on System Status.

## 6.6 Testing - Eclipse Actuator

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 (115/230VAC, 50 to 60 Hz) single phase. Current consumption shall be 0.5 amps at 115VAC.

## 8. Optional Accessories

### 8.1 Battery Option - Extra

This option allows for a "second" internal battery that doubles the actuator closing speeds for the system. Either battery automatically takes over the running of the system on its own, if either battery fails.

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## **8.2 Programmable RIM**

A Relay Interface Module will allow programmable output signals, provided by three additional output relays rated 5.0 amps @ 115 / 230 AC. The Relay, when selected by the operator from a predetermined list, will be indicated by a NO or NC contact.

## **8.3 SCADA Connection**

Direct actuator and microprocessor system status as well as diagnostic information is available through an RS232 Serial Port in ASCII language format.

## **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.