HALOGEN VALVE SYSTEMS, INC.

# Specification

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## Emergency Shutoff System Series CR-1Y (Duplex) – Model II for Chlorine Cylinder and Ton Container Automatic Switchover Systems

## 1. Scope

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

## 2. Description

The emergency shutoff system shall be the Halogen Series CR-1Y comprised of two (2) electrically driven Actuators that act directly upon the cylinder or ton container valve stem. The Actuator shall mount upon the cylinder or ton container valve and yoke assembly by means of a clamping mechanism and a valve stem coupling bushing. This mechanism allows for Actuator removal during cylinder changes.

The Actuator shall deliver 40-50 Ft.-Lb. of closing torque to the valve stem upon receipt of a 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 uninterruptible 12 volt battery power supply and control system.

## 3. Actuator Design

The 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 Actuator shall be provided by 12 volts dc electric motor acting through a gear reduction system to provide sufficient torque to the valve shaft.

### 4.2 Clutch and 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 made 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 a regulator. 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 Duplex control panel 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 actuator shall have a dedicated power source (battery) and microprocessor controller. Electrical power shall be delivered to each Actuator by means a flexible cable. The control panel shall have indicator lights and LCD to display the status of key system elements. The control panel shall accept signals from gas detectors, remote station alarms, and SCADA systems to trigger the Actuator to automatically close the cylinder or ton container valves. The panel shall have the capability of initiating a testing operation of the Eclipse actuator to check the system's continuity.

# 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 providing a diagnostic system to check complete system readiness. In the control circuitry, electro-mechanical relays susceptible to corrosion failure shall not be used. The entire control system shall use encapsulated solid state devices.

In the event of a sustained loss of charging power (three days), the microprocessor shall detect a declining battery charge and 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 a 12 VDC gel-cell, lead-acid type, rated at 8.0 ampere-hours (High Rate). The charging system shall provide a three stage controlled charger that is temperature compensated to optimize battery performance and service life.

## 6.3 Status Lights and Display

The control panel enclosure shall have a membrane panel on the front cover where the operator may observe the status lights and LCD 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 LCD display screen.
3. **System Status Information** – The display screen (LCD) shall have two lines of twenty characters each. Display shall indicate the status of Battery, Actuators, Microprocessor system, Fault Errors and other information as required.

## 6.4 Input Signals

The control panel shall contain a terminal to accept multiple incoming signals for either automatic or manual Actuator operation. External signals shall consist of all normally open or all normally closed dry contacts that are activated to initiate the Actuator.

## 6.5 Output Signal

Upon completion of the activation cycle and upon reaching rated torque, the control system shall provide a closed contact rated at 0.2 amps @ 24 volts.

## 6.6 Testing

Mounted on the membrane panel shall be a **Test** button to provide a full cycle test of the actuator. 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. Test procedures as outlined on controller shall provide the operator with "Go-No-Go" criteria. Test results should be confirmed by operator tactile force on valve.

# 7. Power Requirements

The power supply to operate the control panel circuits shall be (115 / 230 VAC, 50-60 Hz) single phase. Current consumption shall be 0.5 amps at 115 VAC.

# 8. Options

## 8.1 Relay Interface Module

An optional Relay Interface Module, upon completion of the actuator closing cycle, shall provide up to two output contacts rated 5.0 amps @ 115 / 230 volts to indicate each valve torqued plus an additional contact.

## 8.2 SCADA Connection

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

## 8.3 Satellite Gas Detector

This option allows the Satellite Gas Detector to use the internal battery and provide activation directly to the system. Gas Detector's output is converted to trigger a specific ppm set-point that can be shown and selected on membrane panel's LCD display.

# 9. Accessories

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