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# Specification

## Emergency Terminator Shutoff Actuator with a Mercury Controller System for a single Chlorine Cylinder

### 1. Scope

This specification describes the Emergency Terminator Shutoff Actuator System for Chlorine Cylinder Valves as manufactured by Halogen Valve Systems, Inc. This system is designed for installation in conjunction with automatic switch over systems (provided by others) that employs one chlorine container to provide an uninterrupted flow of chlorine.

### 2. Description

The emergency shut off system shall be the Halogen Mercury system comprised of one (1) electrically driven actuator that acts directly on one (1) cylinder valve stem. The actuator shall mount upon each cylinder valve stem by means of a drive bushing and two parallel rods that straddle the gas valve nozzle so as to be removable during cylinder changes.

The actuator shall deliver 40-50 ft.-lb. of closing torque to the valve stem upon receipt of an emergency shutdown signal. The actuator shall be powered only in the closing direction. An uninterruptable 12 VDC battery power supply and a computer controller system shall supply power for the actuator.

### 3. Actuator Design

Each Actuator shall couple by means of a bronze drive bushing to the valve stem and provide stabilization on both sides of the valve by means of two metal rods that secure the unit in place. The extension and drive shaft shall be coupled to the drive motor by means of a one way, positive engagement ratchet assembly that drives the shaft to the closed position and then applies the required torque to the shaft. The valve stem for each cylinder must be opened manually by means of a wrench prior to mounting the Actuator.

### 4. Actuator Components

#### 4.1 Motor Driver

Motive power for the actuator shall be provided by 12-volt DC electric motors acting through direct drive ratchet assembly that applies the closing torque.

#### 4.2 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.

#### 4.3 Attaching other devices.

The coupling mechanism also works with the open or closed yoke in place and requires no tools for installation onto the valve.

The Actuator can be mounted along with vacuum regulator systems commonly used in the industry. Regulator mounting should be done first and all connections checked for leaks per the manufacturer procedures. After the regulator is tested and in place, the actuator can be attached to the valve stem.

All metal components shall be coated with fusion bonded polyester for corrosion resistance.

#### 4.4 Sealing Method

Shaft entrances to the actuator mechanism shall be sealed with "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 Mercury 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 control panel shall have a dedicated power source (battery) and microprocessor controller. Electrical power shall be delivered to the actuator by means 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 to automatically close both of the cylinder valves. The panel shall have the capability of accepting input signals to initiate the operation of the actuator and the 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 time and apply the required torque to the valve stem. The microprocessor shall also monitor and display status of the battery, charging power and system readiness as well as provide a diagnostic system check during the test cycle. 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 (up to seven days), the microprocessor shall detect a declining battery charge to initiate an actuator closure while sufficient power remains to assure the specified torque to the valve stem.

### 6.2 Battery and Charger

The batteries 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 attached to the front which the operator may observe the status lights. The status lights for each respective system are as follows:

1. **Battery Charger Status** - Amber light:
  - a. On steady - to indicate that the battery is fully charged.
  - b. Slow flashing - to indicate slow charging.
  - c. Rapid flashing - to indicate rapid charging.
2. **(A or B) Armed/Ready** - Green lights flash on and off together to indicate the microprocessor is functioning and ready to operate.
  - a. Test - Light is steady during actuator operation then off for 5-second period after activation.
  - b. Emergency - Light is steady during actuator operation then off for 5 seconds then flashing alternately for a 15-second period after activation.

- b. Flashing to indicate the battery is low.
- c. Off indicating battery should be replaced

### 6.4 Input Signals

The control panel shall contain a terminal strip to accept multiple incoming signals to operate an actuator. External signals shall consist of a "Normally Open" dry contact, closures to initiate the actuator. . The control system will allow a change to accommodate a "Normally Closed" circuit by moving the configuration jumper.

### 6.5 Testing

Mounted on the membrane panel on the front of the control panel shall be a **Test** switch to provide a full cycle test of the actuator and the actuator shall provide 20-30 ft.-lb. of closing torque. During the test cycle the microprocessor shall self-test as well as check cable-motor continuity, and the battery under load conditions. Test procedures as outlined on the actuator and control panel label shall provide the operator with "Go"- "No-Go" criteria. Test results are confirmed by operator 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 / 230 volts ac, 60 Hz) single phase. Current consumption shall be 0.5 amp at 115 volts ac.

## 8. Options

### 8.1 Relay interface Module

An optional Relay Interface Module, upon completion of the actuator closing cycle, shall provide up to three-separate output signals 5 amp @ 115/230 volt AC/DC power to indicate Actuator operation. These output signals may be employed to trigger other displays or alarms.

### 8.2 Solar Power

Sustaining battery charge power shall be provided by a Siemens M-5 Solar Module rated for 5 Watts at 15V. Solar powered versions shall not require 115V power.

## 9. Accessories

Standard accessories for each actuator system shall include (1) one wall mounted stowage bracket for temporary placement of the actuator during cylinder changes and (1) one mushroom-style shutoff switch.

3. **Battery Status** - Amber light:
  - a. On indicating the battery is OK