SPECIFICATIONS - DETAILED PROVISIONS
Section 15103.1 - Butterfly Valves,
Earthquake Sensing Pneumatic-Operated

C O N T E N T S

SECTION 15103.1
BUTTERFLY VALVES, EARTHQUAKE SENSING PNEUMATIC-OPERATED

PART 1 - GENERAL

1.01 SCOPE

The following provides the specifications for an earthquake sensing, pneumatic actuated, fail-closed system for use on 24" and smaller butterfly valves.

1.02 GENERAL

The butterfly valve shall be operated by a spring return pneumatic actuator directly mounted on the top of the valve. The pneumatic actuator shall be operated by utilizing dry air supply from one of the compressed air bottles located in a protected enclosure. The butterfly valve is opened when air pressure is supplied to the actuator. In the event of an earthquake, a sensor mounted inside the enclosure shall trigger the release of air from the actuator, allowing the actuator to close the butterfly valve with spring force.

The control system shall include compressed air bottles, a pressure regulating valve, a seismic sensor, a fill valve, relief valves, check valves, pressure gages, isolation valves and other necessary components. The 3/8 inch tubing is to be field connected from the control system enclosure to the butterfly valve actuator to make a complete earthquake valve system.

PART 2 - PRODUCT

2.01 BUTTERFLY VALVES

Butterfly valves shall be of the tight-closing, rubber seat type conforming to the design, strength and testing requirements of AWWA C-504, latest revision. Valves shall be bubble-tight at the rated pressure in either direction and shall be suitable for throttling service and/or operation after long periods of inactivity. Manufacturer shall have manufactured tight-closing, rubber seat type butterfly valves to this standard for a period of at least five years. Valves may be either flanged or lug-body, wafer style. A flanged valve shall fully meet all requirements of AWWA C-504 for a flanged butterfly valve.

A. Body. Valve body shall be constructed of Ductile Iron ASTM 536 grade 65-45-12. Body shall be completely sealed from the media by the elastomer body seat or all wetted ferrous surfaces shall be fully protected by 8-10 mils of epoxy suitable for potable water applications.

B. Disc. Valve disc shall be constructed of aluminum bronze ASTM B148 or 316 stainless steel, or ductile iron with epoxy coating.

C. Shaft. Valve shaft shall be 304/316 stainless steel.

D. Seat. A Buna-N seat shall be mounted on the body interior and may cover the entire iron body interior and provide a positive sealing surface around the shaft. Seat shall be field replaceable without the use of special tools.

E. Bearing. Shaft bearings shall be of the self-lubricating, corrosion-resistant sleeve type.

F. Packing. All valves shall have adjustable or self-adjustable packing, suitable and compatible for the intended service.

G. Testing. All valves shall be performance, leakage and hydrostatic tested in accordance with AWWA C-504-87, Section 4.2.

H. Coating. Per AWWA C-504-87, Section 4.2.

2.02 ACTUATOR

The spring return pneumatic actuator shall be directly mounted on top of the butterfly valve to eliminate any possible misalignment and binding associated with brackets and couplings.

The pneumatic rotary actuator shall be a totally enclosed design with no external moving parts. The actuator shall be of the rack and pinion type, providing constant output torque or Bettis T-series utilizing the "scotch yoke" principal. All units shall be factory tested and lubricated to insure proper operation. The actuator shall have integral porting to eliminate external tubing. The standard operation shall be 0-90^{o} reversible operation for air, gas or hydraulic oil. Actuator shall be capable of operating in any valve mounting attitude, and capable of being mounted either in line or transverse to the pipeline.

The actuator body, end caps and spring cartridge housings shall be made of hard anodized aluminum or steel for maximum environmental protection. The pistons shall be a hard anodized aluminum alloy or bronze or stainless steel. The actuator drive shaft and pinion shall be of hardened and tempered alloy steel. Fasteners shall be electroless nickel-plated. Rubber parts, seals and "O" rings shall be made of nitrile rubber.

The actuator shall be suitable for operation in temperatures ranging from 20^{o} to 200^{o}F. The actuator design shall have been tested for 100,000 cycles under full load with no appreciable wear on parts.

2.03 CONTROL SYSTEMS

Provide the following minimum control components inside a protective enclosure:

A. Two (2) each air bottles, with capacity of 230 standard cubic feet of air at 2200 PSIG. Each bottle to have a service valve with a CGA 346 connection. Air bottles shall be held securely in upright position by minimum two (2) straps.

B. A high pressure manifold rigidly mounted to the enclosure angle iron framing. The manifold shall include two (2) isolation valves, two (2) check valves and two (2) stainless steel pigtails to connect to air bottles.

C. A pressure regulator with a 0-4000 PSI inlet gage and 0-200 PSIG outlet gage capable of reducing the air pressure to 80-100 PSIG for operation of the actuator.

D. Two (2) soft seat check valves, one (1) needle valve to control the actuator opening speed, one (1) adjustable relief valve set at 150 PSI with a "bug" vent at the valve exhaust port.

E. One (1) seismic sensing 3-way pneumatic valve shall be rigidly mounted close to the base of the enclosure. The seismic valve shall be designed such that it will be triggered within five (5) seconds when subjected to a horizontal, sinusoidal oscillation having a peak acceleration of 0.3 with a period of oscillation of 0.4 seconds.

F. One (1) pressure gage, 0-200 PSIG, to show the downstream and pressure of the seismic sensor; one (1) flow control valve to control the closing speed of the actuator and one (1) isolation valve downstream from the flow control valve for maintenance and testing purposes.

G. One (1) fill valve in series with a soft seated check valve shall be connected to upstream of the needle valve (5.4). This fill valve shall be used to open the closed butterfly valve with a portable air tank or a portable air compressor in case of air pressure at both air bottles is not available.

H. All low pressure components shall be plumbed with 3/8" stainless steel tubing with 0.035" wall thickness. Fittings shall be plated carbon steel or stainless steel.

2.04 ENCLOSURE

Enclosure will be constructed with angle iron framing and ruggedly built for long, trouble free outdoor installation. The steel base plate shall be minimum 1/4" thick with four (4) predrilled holes for anchoring to floor ensuring maximum strength and rigidity. The steel roof shall be minimum 14 gage sheet metal.

Enclosure shall have two (2) hinge doors on two opposite sides and minimum 14 gage sheet metal on two other sides. The exterior including doors shall have minimum 12 gage expanded metal covering the bottom half for maximum ventilation and easy inventory control. The top half of the exterior shall have a sheet metal cover except that a window shall be provided on one door for checking the pressure remaining in air bottles without opening the door. Doors shall have the padlock latches to prevent unauthorized access, two (2) Stanley 3 1/4" commercial-grade hinges, and 4" x 1 1/4" handles. Two (2) lifting lugs shall be provided at the top of the enclosure.

Structural steel enclosure frame shall be single pass full welded. Provision shall be made to stiffen members for all spans over four (4) feet. All steel plate, sheet metal and expanded metal shall be attached to the enclosure frame by making one (1) inch long, full single pass welds every four (4) inches for sheet metal and tack welds every eight (8) inches for expanded metal. Permanent red labels shall be provided at the door to warn that the system is using high pressure air. Enclosure shall have a red oxide primer for field finish coating.

PART 3 - EXECUTION

3.01 CONTROL SYSTEM TESTING

A. High pressure section from the air bottle service valves to the pressure regulator shall be pressurized to 2200 PSI and isolated. After 72 hours, the pressure should not be lower than 2000 PSI.

B. Low pressure section from the pressure regulator to the isolation valve (5.6) shall be pressurized to 100 PSI and isolated. After 72 hours the pressure should not be lower than 90 PSI.

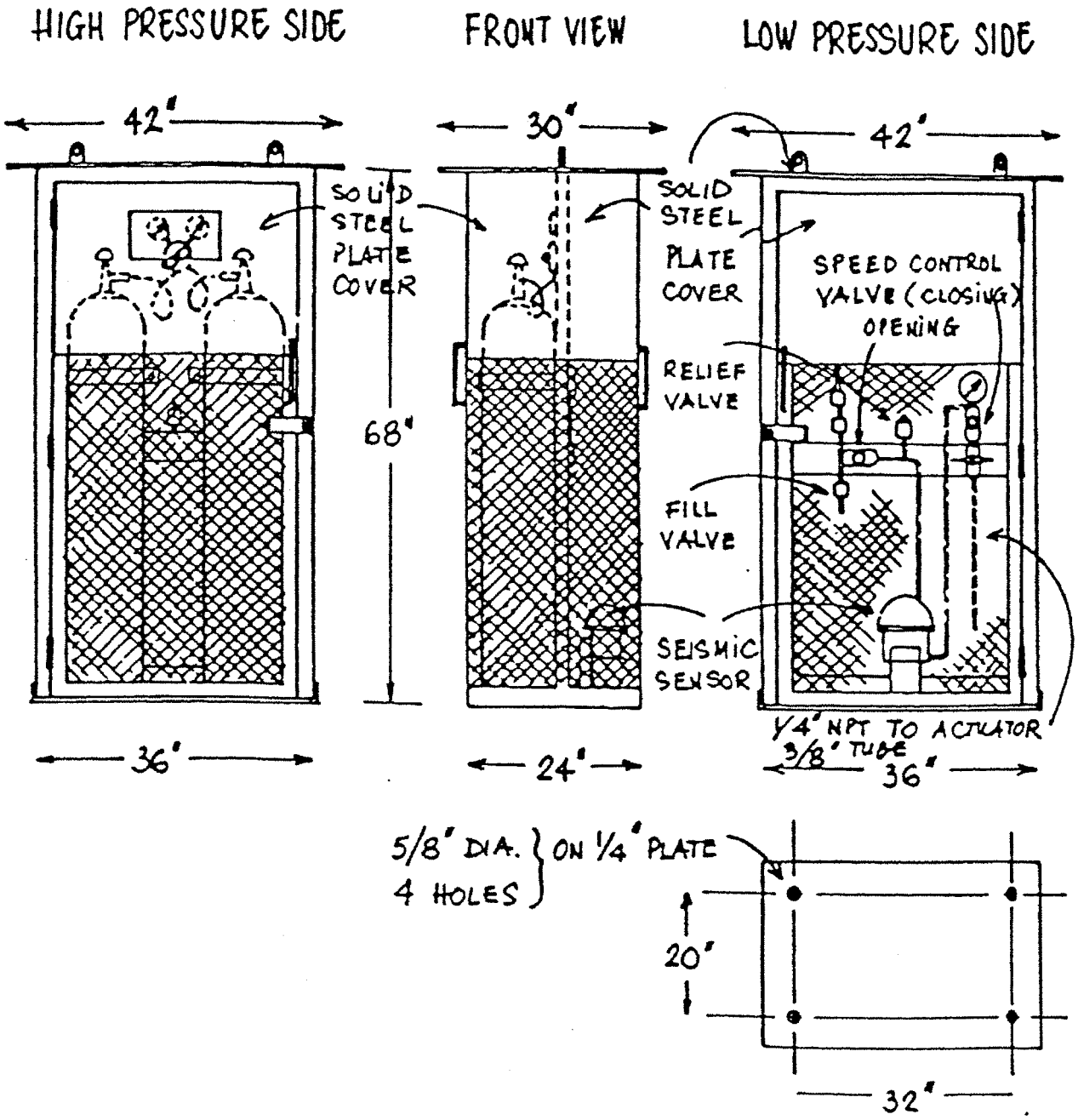
C. With low pressure section isolated and pressurized to 100 PSI, the seismic sensor shall be actuated artificially. Satisfactory operation of the system shall be observed and documented.

END OF SECTION 15103.1

REFERENCE: 3 DETAIL SHEETS

Sheet 1 of 3

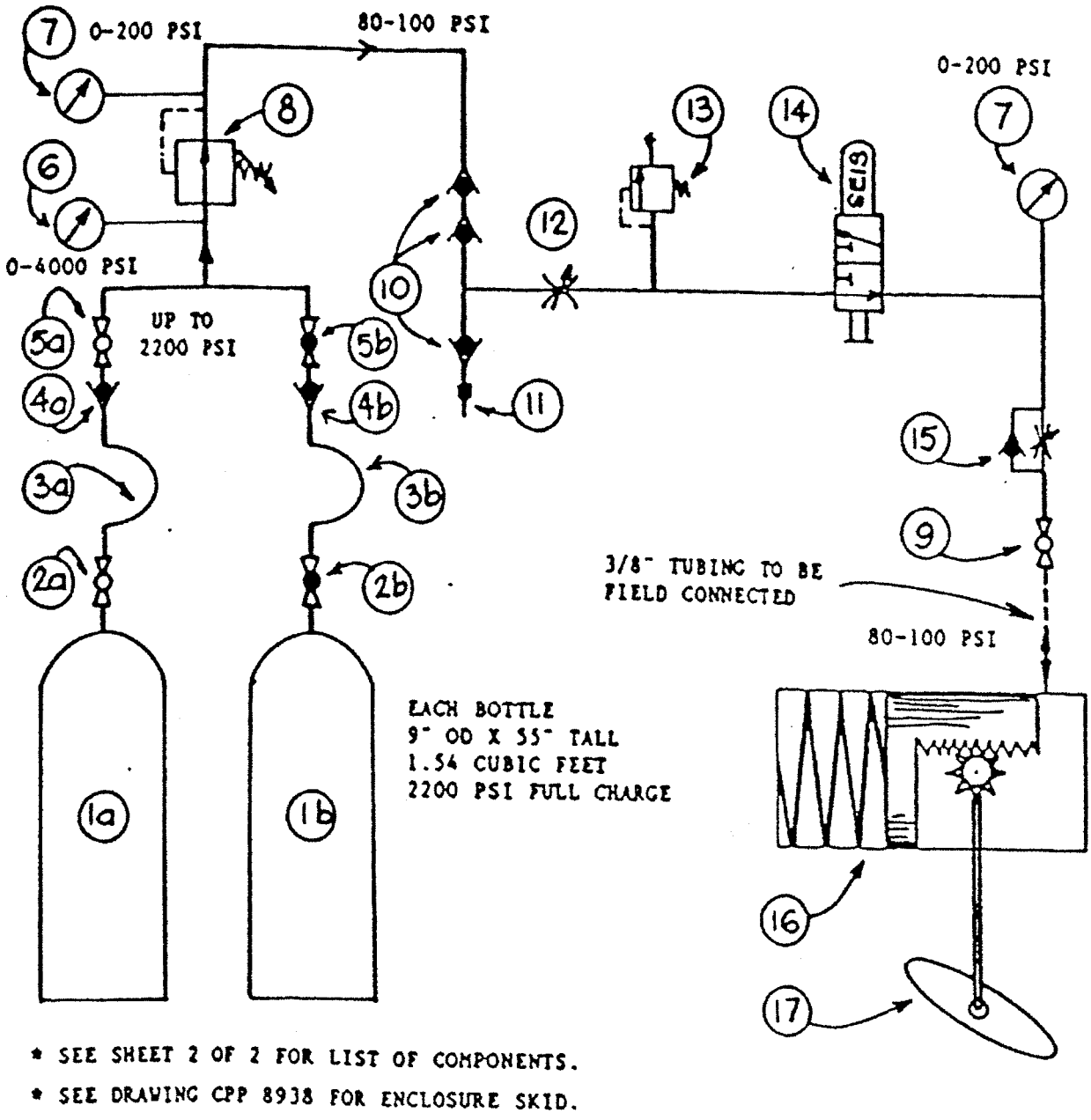
PNEUMATIC CONTROL SYSTEM SKID DIAGRAM
EARTHQUAKE FAIL CLOSE BUTTERFLY VALVE



REFERENCE: 3 DETAIL SHEETS

Sheet 2 of 3

PNEUMATIC CIRCUIT DIAGRAM
EARTHQUAKE FAIL CLOSE BUTTERFLY VALVE



* SEE SHEET 2 OF 2 FOR LIST OF COMPONENTS.
* SEE DRAWING CPP 8938 FOR ENCLOSURE SKID.

REFERENCE: 3 DETAIL SHEETS

Sheet 3 of 3

BILL OF MATERIALS
PNEUMATIC CONTROL SYSTEM
FOR EARTHQUAKE FAIL CLOSED BUTTERFLY VALVE

Refer to Sheet 1 of 2, Pneumatic Circuit Diagram

ITEM NO.	QTY	DESCRIPTION
		Cylinder Assembly
1	2	9 1/4" x 55" Compressed Air Cylinder, 232 standard cubic feet at 2200 psig Charge Pressure.
2	2	Service Valve, part of cylinder above.
3	2	Pigtail
4	2	High Pressure Check Valve
5	2	High Pressure Isolation Valve
6	1	High Pressure Gage (0-4000 psig)
7	2	Low Pressure Gage (0-200 psig)
8	1	Pressure Regulator
9	1	Isolation Valve
10	3	Soft Seated Check Valve
11	1	Fill Valve
12	1	Needle Valve
13	1	Pressure Relief Valve (150 PSI)
14	1	Koso 400, Earthquake Actuated 3 Way Valve
15	1	Flow Control Valve
16	1	Spring Return Pneumatic Actuator
17	1	Ductile Iron Body Butterfly Valve

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