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RESEARCH REPORT: RR 5080
EFFECTIVE DATE: 11/01/07
EXPIRATION DATE: 11/01/08
Telephone: 800-442-7633

GENERAL APPROVAL - Renewal - "California" Earthquake Activated Gas Shut-Off Valves, manufactured by Pacific Seismic Products, Inc. See attached page for the list of approved models.

DETAILS

These products are seismically actuated gas shut-off valves. They are intended to be installed in the natural-gas supply line outside of buildings or other locations approved by the Department. The valve assembly consists of an aluminum body and an aluminum bonnet with sight glass. The trip mechanism consists of a ball located on a stationary post that has a seat formed by either (a) a conical depression with a certain angularity to the horizontal, or (b) a depression whose lower portion is cylindrical with a certain diameter (which is where the ball seats) and whose upper portion is chamfered at a certain angularity to the horizontal and has a certain diameter at the top, and that is encircled by a narrow horizontal rim whose outer circumference is the outer edge of the top of the post. Seismic activity causes the ball to move to the reacting cylinder, activating the valve to close. Manual resetting of the valve is done by using a five sixteenth inch (5/16") blade screwdriver, three thirty second inch (3/32") hexagonal socket wrench, or three eighth inch (3/8") box-end, open end, socket, or adjustable wrench, as appropriate.

The approval is subject to the following conditions:

1. These Seismic gas shutoff valves (SGSOV) may be used in low-, medium-, or high-pressure gas systems in all occupancies whose maximum operating pressure does not exceed the pressure rating specified on the valve and may be installed to comply with Ordinance 171874 and Section 94.1219 of the Los Angeles Plumbing Code (LAPC), 2002 Edition.
2. The size of the SGSOV shall be such that sufficient gas pressure is provided to all appliances when full demand is being supplied to all appliances and the following:
 - a. SGSOV's installed on the supply side of the bypass "T" on the meter set may be sized at the discretion of the gas service provider provided the requirements specified above are met.
 - b. SGSOVs installed on low pressure gas systems and serving one building shall be the same size or larger than the building stub size. If a single SGSOV is used on a low pressure gas system that serves multiple building stubs or additional demands beyond what is supplied to the building stub, the size of the SGSOV shall be the same size or larger than the minimum size required by Table 12-3 of Los Angeles Plumbing Code (LAPC), 2002 Edition for the total volume of gas flowing through the SGSOV.
 - c. SGSOVs installed on low pressure gas systems with a size smaller than the size as the gas piping immediately downstream of the bypass "T" of the meter set or the building stub, whichever is larger and all SGSOV's installed on medium and high

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gas pressure systems shall require approval by the Mechanical Plan Check Section. SGSOV's shall be sized by the engineering methods described in Condition No. 3 of this report or by other means acceptable to the mechanical plan check engineer. SGSOV size calculations shall be shown on an approved set of plumbing plans for the complete gas system.

SGSOV's sized by methods (a) or (b) above do not require the submittal of engineering calculations to Mechanical Plan Check though the gas system itself may required plan check.

3. Gas systems with SGSOV's sized by engineering methods shall utilize the information shown at the end of this report and shall comply with the following:
 - a. Low pressure gas systems which utilize a SGSOV shall be so designed that the pressure loss from the meter to the outlet serving the furthest fixture shall not exceed 0.5 inches of water column with full demand being supplied to all outlets. This loss shall include the losses associated with the gas piping, the seismic gas shutoff valve and any other components of the system including but not limited to excess flow gas shutoff valves.
 - b. Low pressure gas systems may be installed with a pressure drop through the system which exceeds 0.5 inches of water column provided that the factory specification sheets for all appliances showing that their minimum operating pressures are provided and that at least their minimum pressures are being met by the system when all appliances are simultaneously operated at maximum capacity.
 - c. The table of equivalent lengths attached to this report may be used for sizing low pressure gas systems with SGSOV's.
 - d. Medium and high gas pressure systems shall be sized by engineering calculations in accordance with the requirements of the appliances, the components installed, and Chapter 12 of the Los Angeles Plumbing Code, 2002 Edition.
4. These SGSOV's shall be installed in accordance with the most restrictive provisions of the manufacturer's instructions, LAPC, and this Research Report. Installation and maintenance shall be performed by qualified personnel only as defined in LAPC and,
 - a. Unions may be installed downstream of the bypass "T" of the utility's meter set assembly, outside of the building, for the installation of these SGSOVs.
 - b. The SGSOV is not equivalent to, nor is it to be substituted for, any required manual shut-off valve for the building gas supply.
5. These SGSOV's shall be installed in the gas service piping at an accessible location. They shall be rigidly attached to the building or other structure acceptable to the administrative authority with 2 brackets, or by other approved means. The brackets shall be mounted within 6 inches of each end of the valve. SGSOV's installed with Mechanical Test Lab approved mounting brackets shall utilize the mounting techniques specified under their approvals.
6. SGSOVs may be installed in the gas line in one of the following locations:
 - a. On gas service lines downstream of the bypass "T" of the meter set assembly, by a licensed contractor or qualified installer or,
 - b. Upstream of the juncture of the building-line stub and the bypass "T" of the meter set assembly by the gas utility or a contractor, working under contract of the gas utility.

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7. All building gas supply lines served by one main meter may be served by one or more SGSOVs of the appropriate size except that installations of multiple valves in parallel that supply one down stream system are not allowed.
8. Where multiple buildings on a site are served by a central gas utility meter, one or more SGSOVs of the appropriate size shall be installed on each building.
9. After installation of the valve, all new joint connections shall be checked for leaks using a rich soap bubble mixture or other approved method. If this valve is installed by the gas utility, the utility shall provide the soap bubble mixture needed for the leak test.
10. If the SGSOV is actuated by an earthquake, the gas system shall be tested for leaks and shall be reset by a person qualified to perform the reset and gas leak detection tests, and by a qualified installer (a single family dwelling homeowner is recognized as a qualified installer by LAPC).

NOTE: The gas cock to each gas appliance shall be turned off after actuation by an earthquake valve prior to resetting of the valve for the purpose of testing for leaks.

11. A plumbing permit shall be obtained each time an SGSOV is installed except that only one permit is required when multiple SGSOVs are installed at the same time on a single building. SGSOVs installed by the gas utility or a contractor authorized and contracted by the gas utility upstream of the bypass "T" of the meter set, shall not require a permit.
12. Plan check on gas systems shall be required for:
 - a. Systems having ten (10) or more outlets,
 - b. Systems that are operated at pressures less than six (6) inches of water column or greater than fourteen (14) inches of water column; or
 - c. Whose maximum demand or developed length exceed the limits of Tables 12-3,-4,-5 or -6 of LAPC, 2002 Edition.
 - d. Systems utilizing SGSOV's sized by the methods described in Condition No. 2 (c) of this report.
13. Installation in existing occupancies do not require plan check if the existing gas meters are Models MSA Size 1 or MSA Size 2 and, the SGSOV's are sized based on the methods of 2(a) or 2(b) above.
14. The manufacturer shall provide a thirty-year warranty that the valve is free from defects and will continue to operate properly for thirty years from the date of its original installation in accordance with Section 94.1219.3.5 of LAPC, 2002 Edition.
15. Each valve shall be permanently identified with the following information where it will be visible after installation for inspection purposes:
 - a. Name of the valve manufacturer.
 - b. Appropriate valve size and model number.
 - c. Division of State Architect's logo.
 - d. Listing mark of an approved testing laboratory.
 - e. Date code of the manufacture of the valve.

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DISCUSSION

These valves have been tested in accordance with Standard ASCE 25-97 and are listed by Underwriters Laboratories, Inc. under File No. 150201-SA12452.

Current production samples were examined and test reports were reviewed by the Mechanical Testing Laboratory. The materials and construction appear to be equivalent to that prescribed by the Los Angeles Municipal Code in quality, strength, effectiveness, durability, and safety.

For this General Approval to be valid on any individual construction project in the City of Los Angeles, an engineer or inspector of the Department of Building and Safety must make a determination that all conditions of the General Approval required to provide equivalency have been met in the case of each construction project under consideration.

This approval is granted under Sections 94.301, 94.1203, 94.1210, 94.1211, 94.1213, 94.1217, 94.1218 and 94.1219 of the Los Angeles Plumbing Code, 2002 Edition.

Approved by:

Thomas Liu, Director
Mechanical Testing Laboratory
Engineering Bureau

Prepared by: Yogen R. Thakar
Mechanical Testing Laboratory

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**RR -5080: PACIFIC SEISMIC PRODUCTS
 SEISMIC GAS SHUTOFF VALVES**

Method of Directly Calculating the Flow Through the SGSOV

Model	Size (in.)	Maximum Gas Supply Pressure (psig)	Cv
**300	3/4	0.5 or 7.0*	21
**301	1	0.5 or 7.0*	41
**302	1-1/4	0.5 or 7.0*	64
**303	1-1/2	0.5 or 7.0*	101
**310	3/4	20 or 60*	21
**311	1	20 or 60*	41
**312	1-1/4	20 or 60*	64
**313	1-1/2	20 or 60*	101
**314	2	20 or 60*	164
**315	3	20 or 60*	336
**316	4	20 or 60*	480
**317(F)	6	60	1766
**318	2-1/2	60	236
**319(F)	8	60	3136

- Note: 1. Valve models without any suffix have Nominal Pipe Thread (N.P.T.) connection/joints. Suffix F indicates flanged connections.
- *2. Pacific Seismic Products, Inc., uses the same model numbers for twelve additional models that are rated to a higher maximum operating pressure. This chart shall not be used to determine the maximum pressure ratings of the valves. The ratings marked on the valves shall be the only method used to determine the maximum pressure rating of the valves.
- **3. Model numbers may be preceded by a VB or VT which indicates “vertical bottom” inlet or “vertical top” inlet, respectively. Model with a VB or VT have vertical up or vertical down gas flows. Models without a VB or VT prefix have horizontal gas flows.

Flow through the valve may be calculated with the following formula:

$$Q = 1360 * Cv * ((\Delta P * P2)^{0.5}) / ((G * Ta)^{0.5})$$

Where:

- Q = the flow in CFH at standard temperature and pressure
- DeltaP = inlet pressure - outlet pressure in PSI (the pressure loss through the valve)
- P2 = outlet absolute pressure of the valve in PSI (gage pressure + 14.6959 PSI) (also equal to the meter pressure - DeltaP)
- G = specific gravity of gas (0.64)
- Ta = absolute temperature of flowing gas in Rankine (deg F + 460)
- Cv = valve flow coefficient from table

Note: Formula valid only when outlet pressure is greater than 1/2 of the inlet pressure and for supply pressures not greater than 5 PSI.

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Method of Equivalent Lengths for Low Pressure Gas Systems

Gas systems sized by the method of equivalent lengths shall add the equivalent length (EL) of the seismic gas shutoff valve to total developed length (TDL) of the gas system. Pipe sizing of the system shall be per the methods of Chapter 12 of LAPC, 2002 Edition but using the TDL + EL as the total length of the gas pipe. The equivalent length of the SGSOV models are indicated in the table below. The equivalent length used for the SGSOV shall correspond to the pipe size required by Table 12-3 of LAPC, 2002 Edition for the total volume of gas flowing through the SGSOV (the building stub size, in most cases).

Table of Equivalent Lengths for Low Pressure Gas Systems

Model	Size (in.)	Equivalent Length (ft.) for various gas service pipe sizes										
		3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
300	3/4	3	6	25	50	X	X	X	X	X	X	X
301	1	0	3	7	15	50	X	X	X	X	X	X
302	1-1/4	0	0	4	6	20	55	X	X	X	X	X
303	1-1/2	0	0	1	5	10	20	X	X	X	X	X
310	3/4	3	6	25	50	X	X	X	X	X	X	X
311	1	0	3	7	15	50	X	X	X	X	X	X
312	1-1/4	0	0	4	6	20	55	X	X	X	X	X
313	1-1/2	0	0	1	5	10	20	X	X	X	X	X
314	2	0	0	0	1	5	9	25	X	X	X	X
314	2	0	0	0	1	5	9	25	X	X	X	X
318	2 1/2	0	0	0	1	4	8	20	X	X	X	X
318	2-1-2	0	0	0	1	4	8	20	X	X	X	X
315	3	0	0	0	0	1	4	10	25	X	X	X
315	3	0	0	0	0	1	4	10	25	X	X	X
316	4	0	0	0	0	0	1	3	13	40	X	X
316	4	0	0	0	0	0	1	3	13	40	X	X
317F	6	0	0	0	0	0	0	0	1	3	13	35
319F	8	0	0	0	0	0	0	0	0	0	0	9

Note: These valves shall not be used on systems indicated by X and larger.