SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

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REGULATORS
Boot Type Control Valves

1. SCOPE

This specification covers pneumatically actuated control valves typically known as "Boot Type Regulators." These valves are used for pressure reducing or pressure relieving applications. The control assembly consists of an adjustable restrictor and pilot regulator, the valve being positioned by the loading and unloading of the restrictor/pilot assembly. These valves are primarily used in pressure-reducing applications where total operational shutoff is not required. All regulators covered by this specification, when installed as a single component, may be installed without an installation pressure test.

2. APPLICABLE DOCUMENTS

2.1 American National Standards Institute (ANSI) B-1.20.1, "Pipe Threads, General Purpose (INCH)."

2.2 American National Standards Institute (ANSI) B-16.5, "Steel Pipe Flanges and Flanged Fittings – Class 150 through 2500."

2.3 American National Standards Institute (ANSI) B-16.104-1976, "Control Valve Seat Leakage."

2.4 American National Standards Institute (ANSI) Z-55.1, "Specification for Gray Finishes for Industrial Apparatus and Equipment."

2.5 United States Department of Transportation (DOT), Code of Federal Regulations, Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline; Minimum Safety Standards."

NOTE: Unless otherwise specified, the editions of the above documents incorporated by DOT 49 CFR 192 are applicable. Documents not incorporated by DOT 49 CFR 192 will be the most recent edition.

3. TERMINOLOGY

3.1 General

3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.

3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.

3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required technical product information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.

4. MATERIALS AND MANUFACTURING

4.1 All pressure retaining parts (except the expansible element) shall be made of aluminum, cast iron, ductile iron, carbon steel or stainless steel.

4.2 The expansible elements shall be nitrile, nylon reinforced nitrile, viton, hydrin, or other approved material.

4.3 The regulator shall be capable of withstanding temperatures ranging from -20º F to 150 º F (-28.9º C to 65.5º C).

4.4 The body of each unit shall be subjected to and pass an internal pressure test of at least 150% of it's maximum operating pressure. The test pressure will be applied equally to the inlet, outlet and loading ports without leakage or other failure.

4.5 Assembled units shall be tested to determine acceptable shut off characteristics. Such tests will be conducted in accordance with the ANSI B16-104 - 1976, Class VI specification. Leak through will not be greater than zero bubbles per minute for a period of at least one minute.

4. MATERIALS AND MANUFACTURING (Cont'd)

4.6 All materials used in the manufacture of regulators supplied to this specification will be compatible with natural gas. No copper components will be accepted.

4.7 Products should meet customary and workman-like standards of fit and finish.

4.8 All pressure supply, loading or control lines and their associated fittings, ferrules, lock rings and connections will be manufactured entirely from stainless steel. No copper or carbon steel tubing or fittings will be accepted. Use of non-compatible components is not acceptable i.e., stainless steel tubing and carbon steel fittings.

4.9 All replacement parts for use in regulators supplied to this specification will perform to the original or subsequently pre-approved design criterion. Any design or materials changes to any part supplied for a particular regulator is subject to the provisions of 4.1.

4.10 Replacement parts commonly used to repair specific areas of the regulator (i.e., boot/cage or diaphragm/cage replacement), will be made available in packaged kit form that will include all normally replaced parts, including all soft parts (o-rings, gaskets, etc.) by either the manufacturer or the manufacturers representative. Each parts kit will be provided with a unique part number to identify the particular kit and its contents.

4.11 Threaded pipe connections must conform to the requirements of ANSI B-1.20.1.

4.12 Flanges must conform to the Requirements of ANSI B-16.5.

4.13 The valve inlet and outlet piping connections will not exceed an axial alignment tolerance of ±2° and will be within radial offset tolerance of ±0.0625".

4.14 A recess of at least ¼" shall be provided beyond all threaded connections to minimize the possibility of butting pipe against any component part within the regulator body.

4.15 The external components of the regulator shall be made of, or protected by, materials resistant to attack by atmosphere, weather, or sunlight, and of agents used in regulator repair and cleaning. The exteriors shall be capable of meeting or exceeding exterior performance requirements in ANSI B109.4. Unless otherwise specified, all regulators shall be coated with an Industrial Gray Coating No. 49 per ANSI Z-55.1. The paint application procedures and a description of the specific painting products to be used shall be submitted for approval.

5. PERFORMANCE REQUIREMENTS

5.1 When assembled with control components recommended by the manufacturer, the valve must maintain delivery pressure at flowrates and pressures specified in the manufacturer's documentation for any approved configuration.

5.2 When assembled with control components recommended by the manufacturer, all valve performance attributes published by the manufacturer must be reproducible and repeatable.

5.3 When under normal operating conditions, excluding failure from foreign material or component damage that prohibits proper valve operation, the valve will exhibit shutoff in accordance with the limitations established in the ANSI B16.104-1976 standard.

5.4 When assembled with control components recommended by the manufacturer, maximum regulator lockup pressures will not exceed those listed in Table F-4.1

Maximum Lockup Pressure	
Nominal Outlet Pressure	Maximum Lockup Pressure
0 - 12 psig	25% over setpoint
12 - 60 psig	3 psig over setpoint
Over 60 psig	5% over setpoint

TABLE F-4.1

6. INSPECTION

6.1 Successful review of the Product Information Package (PIP) as well as any future reference by Southwest to the seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found and will not relieve the Seller from meeting all the requirements of this specification.

6.2 SWG retains the option to inspect the manufacture and testing of any and all materials, products or systems referenced in this specification that are sold to SWG.

6.3 SWG will make appropriate inspections and tests of any and all materials, products or systems supplied to this specification. Southwest will have the right, at their option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after Southwest assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.

6.4 Any changes in the manufacturing of previously approved materials, products or systems described in this material specification for sale to SWG, must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection as an approved supplier.**

7. CERTIFICATION

The manufacturer's or supplier's certification shall be furnished to Southwest. This certification shall state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

Upon the request of Southwest, the certification of an independent third party indicating conformance to the specification may be considered at Southwest's expense.

The applicable operational criterion of Title 49 CFR Part 192 Section D has been met and the Maximum Allowable Operating Pressure (MAOP) was established as required by Title 49 CFR Part 192.619 and that the device may be installed without need of further qualification testing.

8. DOCUMENTATION

8.1 Safety Data Sheets

In accordance with law, the Seller will supply Safety Data Sheets for all applicable items supplied under this specification to the following:

1) The Receiving Location
2) Engineering Staff
3) Southwest Gas Corporation
   Corporate Safety
   Mail Station LVA-120
   P.O. Box 98510
   Las Vegas, NV 89193-8510

8.2 Product and Technical Literature

Product and technical literature shall be maintained and updated to reflect the current state of product knowledge. The literature shall be provided in electronic format, preferably on portable media (CD or DVD). This information should be mirrored on a website or updated to the portable media.

9. PRODUCT MARKING

9.1 The following information shall be permanently marked on the regulator diaphragm case or shall be stamped on a metal tag permanently affixed to the regulator diaphragm case.

- Manufacturer
- Regulator Model Number/ Type
- Orifice Diameter
- Spring Range
- Maximum Inlet Pressure
- Maximum Outlet Pressure
- Month and Year of Manufacture

9.2 The direction of the gas flow shall be clearly and permanently marked on the regulator body.

10. PACKAGING AND PACKAGE MARKING

10.1 All regulators will be packaged in a manner to prevent damage during shipping, transportation and storage.

10.2 Each regulator will be packaged with an appropriate instruction manual.

10.3 Individual springs packaged with an adjuster travel limiting device will include a written warning tag affixed to the spring informing the installer of the necessity of installing the travel limiting device.

10.4 The package will be marked with the following information:

- Manufacturer's name or trademark
- Model designation
- Manufacturer's part number
- Connection size and type
- Orifice size
- Spring range

10.5 Parts kits will be packaged in a box or sealed in a durable plastic bag.

11. REGULATOR SETTINGS

Unless otherwise specified, all valves supplied to this specification that include control components as a pre-assembled package will be delivered with the adjustment screw adjusted to the midpoint of adjustment travel.

12. STOCK CLASSIFICATION DESCRIPTIONS

12.1 Valve only:

CONTROL VALVE, MFG NAME & MODEL, VALVE SIZE (IF THREADED, NOMINAL SIZE INCH NPT) (IF FLANGED NOMINAL SIZE ANSI FLANGE DESIGNATION & FLANGE FACE TYPE (RF OR FF)), WITH/WITHOUT INLET SCREEN, WITH/WITHOUT TRAVEL INDICATOR, WITH/WITHOUT BODY TAPS).

12.2 Complete pre-piped regulator:

REGULATOR ASSEMBLY, MFG NAME & MODEL, VALVE SIZE (IF THREADED, NOMINAL SIZE INCH NPT)(IF FLANGED NOMINAL SIZE ANSI FLANGE DESIGNATION & FLANGE FACE TYPE (RF OR FF)), WITH/WITHOUT INLET SCREEN, WITH/WITHOUT TRAVEL INDICATOR, WITH BODY TAPS), PILOT MODEL, COLOR PILOT SPRING (RANGE - LOW TO HIGH), RESTRICTOR MODEL, ALL STAINLESS STEEL TUBING AND FITTINGS.

Miscellaneous Parts:

PART DESCRIPTION, MFG NAME & MODEL, PART SIZE.