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Self-Operated Diaphragm-Type Natural Gas Service Regulators

For Nominal Pipe Size 1¼ inches (32 mm) and smaller with outlet pressures of 2 psi (13.8 kPa) and less

Secretariat

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PREFACE

This publication presents a basic standard for the safe and reliable operation and the substantial and durable construction of self-operated diaphragm-type natural gas service regulators for nominal pipe size of 1¼ inches (32 mm) and smaller with outlet pressure of 2 psig (3.48 kPa) and less. This work is the result of years of experience that has been supplemented by extensive research. The standard is intended to meet the minimum design, material, performance and testing requirements for efficient use of service regulators.

It is recognized that during any transition period to the metric system, sizes and dimensions need to be expressed in either the metric system or the inch-pound system or both. In this document, both systems are used with the inch-pound units given preference. In most cases, a soft conversion from existing inch-pound values is shown. Soft conversion implies a change in nomenclature only. In this document, the alternative nomenclatures (metric and inch-pound) are shown by using parentheses and can be used interchangeably.

Nothing in this standard is to be considered as in any way indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow the construction and performance of service regulators that may exceed the various provisions specified in any respect. In this standard's preparation, recognition was intended to be given to the possibility of improvement, through the ingenuity of design or otherwise. As progress takes place, revisions may become necessary. Whenever such revisions are believed desirable, recommendations should be forwarded to the Chairman of ANSI B109 Committee, American Gas Association, 400 N. Capitol St., NW, Washington, DC 20001

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HISTORY OF DEVELOPMENT OF THE STANDARD FOR SELF-OPERATED DIAPHGRAM-TYPE GAS SERVICE REGULATORS

In December 1989 at an ad hoc meeting, representatives of the ANSI Z223.1 and Z21 committees, AGA, Gas Appliance Manufacturers Association (GAMA) and several other industry organizations recommended that an ANSI standard for service regulators be developed. It was recognized that a systems approach to pressure control and over-pressure protection was necessary to ensure consistency between the ANSI standards that cover the houseline and the utilization equipment. In April 1990, a revision that added service regulators to the scope of ANSI B109 ASC was approved.

The AGA Operating Section assembled a service regulator standard development task group with representatives from the AGA Distribution Measurement Committee, Customer Service and Utilization Committee, Distribution Engineering Committee and the major service regulator manufacturers. A representative from the Committee on Canadian Gas Service Regulator Standard was also included. Throughout the development, consideration was given to harmonizing the new standard with the Canadian standard. A first draft was completed in 1993. The draft was revised a number of times and was approved by the AGA Operating Section before it was presented to the ANSI B109 Accredited Standard Committee in January 1996.

The ANSI B109 Accredited Standard Committee requested comments on the proposed service regulator standard in May 1996. During a public meeting on Jan. 30, 1997, the committee addressed the comments and approved the standard for submittal to ANSI for endorsement as an American National Standard. The first edition was approved in April 1998.

The B109 Committee reaffirmed the existing standard in 2008. In 2009 the Committee submitted a Project Initiation Notification (PINS) to begin the revision process. Begun in 2010, the revision of the standard included deliberation on topics like salt spray test and high-density polyethylene (HDPE). The revision process concluded in December 2016 with the publication of the second edition incorporating setpoints up to 2 psig and recommended maximum allowable operating pressures (MAOP) downstream.

The third edition addresses the use of integral slam shut valves used to shut off the supply of gas from the service regulator as another means of overpressure protection (OPP). The slam shut device is commonly used outside of North American as a primary means of OPP. In some installations, venting of gas through an internal relief valve may not be allowed due to clearance issues and population density in the immediate area of the regulator. The committee added language to accommodate slam shut valves and testing criteria used to validate their design and performance.

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1.0 Scope

This standard shall apply to the minimum design, material, performance and testing requirements of 1¼ inches (32 mm) and smaller self-operated diaphragm-type natural gas service regulators operating at inlet pressures up to 125 psig (861.8 kPa). These regulators are used to control the gas delivery pressure (also referred to as set pressure or P_2) to pressures at 2 psig or less (13.8 kPa). This standard shall apply only to regulators manufactured after the approval date of this standard.

This standard includes overpressure protection options including internal relief valves (IRVs) and self-operated integral slam shut valves.

2.0 Definitions

Regulator Accuracy: The deviation in outlet pressure from the set point.

Slam-Shut Accuracy Group: The deviation in outlet pressure from the setpoint measured as a percentage.

Bypass: A device, usually internal to the slam shut, that allows the equalization of pressure across the slam shut valve in order to reset it from a closed position.

Casings: The casing is a pressure retaining part of the regulator which encloses either the spring and/or diaphragm assembly.

Diaphragm: A flexible element used to sense the outlet pressure and, in combination with the loading spring and linkage, to position the valve to control the downstream pressure.

Diaphragm Case or Casing: The housing for the diaphragm usually consists of an atmospheric or ambient casing and a gas or fuel casing. The gas or fuel casing and the diaphragm form the gas or fuel chamber. The atmospheric or ambient casing and the diaphragm form the atmospheric or ambient chamber. The diaphragm seals and separates the gas or fuel chamber from the atmospheric or ambient chamber. The atmospheric or ambient chamber houses the loading spring and vents into the atmosphere.

Diaphragm Plate: A rigid disk in contact with the diaphragm, which transmits the force of the loading mechanism (weights, springs, etc.) to the diaphragm.

Droop: The drop in outlet pressure from set point with respect to increasing gas flow rate.

Fixed-Factor Regulation: Regulator accuracy held to typically +/- 1% absolute (ABS) of set pressure or P_2, which will allow a utility to meter gas without doing pressure correction at the meter.

Hysteresis: Characteristic used to describe a deviation in the regulator performance based on internal friction, the diaphragm material and flow. This may also be referred to as regulator deadband.

Inlet Pressure, Rated: The highest inlet pressure allowed to be supplied to the regulator.
Inlet Pressure, Maximum: The highest inlet pressure to which tests have been conducted to determine that the regulator will control the outlet pressure within acceptable limits.