



**ANSI B109.2**

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**DIAPHRAGM-TYPE  
GAS DISPLACEMENT METERS  
(500 Cubic Feet Per Hour Capacity and Over)**

**Secretariat**



**400 North Capitol Street, NW, 4<sup>th</sup> Floor  
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U.S.A.**

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## PREFACE

This publication represents a basic standard for safe operation, and substantial and durable construction for diaphragm-type gas displacement meters having a gas flow rating of 500 cubic feet per hour capacity (14.16 m<sup>3</sup>/h) and over at 0.5-inch water column (125 Pa) differential pressure at base conditions. This work is the result of years of experience, supplemented by extensive research. The standard is designed to help ensure efficient performance and substantial construction of equipment.

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 in both. In this document, both systems are used, with the inch-pound units given preference. A soft conversion from existing inch-pound values is shown. Soft conversion implies a change in nomenclature only; in this document, the alternative nomenclature (metric) is shown by using parentheses.

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 displacement meters that may exceed the various provisions specified in any respect. In its preparation, recognition was intended to be given to the possibility of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations should be forwarded to the Chairman of ANSI B109 Committee, Operating and Engineering Section, American Gas Association, 400 North Capitol Street, NW, 4<sup>th</sup> Floor, Washington, DC 20001, U.S.A.

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## HISTORY OF THE DEVELOPMENT OF THIS STANDARD

Following approval in 1973 of the Standard for Gas Displacement Meters (Under 500 Cubic Feet per Hour Capacity), ANSI B109.1, a subcommittee was appointed to develop a standard covering gas displacement meters with capacities of 500 cubic feet per hour and over.

Six drafts of the standard were prepared and reviewed by the subcommittee before a final draft was prepared and submitted to American National Standards Committee B109 for its consideration on June 14, 1979. Subsequent to adoption by the committee, the first edition of the standard for gas displacement meters (500 cubic feet per hour capacity and over) was approved as an American National Standard by the American National Standards Institute, Inc., on April 14, 1980.

The second edition was approved on January 9, 1987 and included a new part on auxiliary devices for gas meters, plus an informative Appendix on bar coding.

In the third edition, minor editorial changes and a title correction were made. The third edition was approved on November 12, 1992.

In the fourth edition, several additions/deletions were made to avoid ambiguity, to make it more consistent with industry practices, and to improve upon some requirements. Several minor editorial changes and reaffirmation of the standard was approved by ANSI on April 13, 2000. The document was reaffirmed by ANSI on April 16, 2008 without any change to the document.

During the 2018 review cycle, the standard went through a thorough review and update. The review and reaffirmation period exceeded the five-year period and ANSI withdrew the standard from publication on 4/28/2018. Work on the update continued and the standard was re-introduced with extensive changes and updates. Published as the fifth edition in 2020, the B109.2 standard provides the basis for small commercial and larger diaphragm meters used within the natural gas industry. Additional review and documentation are planned to follow this publication to further update sections, as necessary, to reflect current trends and technological advances pertaining to meters covered by this standard. Substantive changes are shown by a bar [ | ] in the margin.

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## SCOPE

This standard applies to diaphragm-type gas displacement meters, designed for revenue measurement of fuel gas, having a flow rating of greater than 500 cubic feet per hour (14.16 m<sup>3</sup>/h) capacity at 0.5-inch water column (125 Pa) differential pressure at base conditions.

Part I comprises a list of definitions and terms used throughout the standard.

Part II covers the construction requirements for qualifying new-type meters in the designated flow-rate ranges.

Part III covers the performance requirements for qualifying new-type meters in the designated flow-rate ranges.

Part IV covers the “in-service” performance requirements for diaphragm-type meters in the designated flow-rate ranges.

Part V addresses installation requirements for these meters.

Part VI pertains to auxiliary devices used with meters covered by this standard.

Part VII covers test methods and equipment.

## PART I

### DEFINITIONS

- 1.1 **ACCURACY, METER.** The degree to which a meter correctly measures the volume of gas passing through it, determined by comparing the volume registered by the meter with that registered by the prover. (See Appendix D for methods of expressing meter accuracy.)
- 1.2 **AUTOMATIC INTEGRATORS**
- 1.2.1 **Recording Type.** This type of automatic integrator is equipped with corrected and uncorrected volume counters and a chart to record the time, pressure or temperature, or combinations thereof.
- 1.2.2 **Non-Recording Type.** This type of automatic integrator is equipped with corrected and uncorrected volume counters.
- 1.2.3 **Automatic Integrating Device for Pressure.** An automatic integrating device for pressure is an auxiliary device designed to automatically correct a volume-related input to some predetermined base pressure condition.
- 1.2.4 **Automatic Integrating Device for Temperature.** Automatic integrating device for temperature is an auxiliary device designed to automatically correct a volume-related input to some predetermined base temperature condition in accordance with Charles' Law.
- 1.2.5 **Automatic Integrating Devices for Pressure and Temperature.** An automatic integrator device for pressure and temperature is an auxiliary device designed to automatically correct a volume-related input to some predetermined base pressure and base temperature condition in accordance with Boyle's Law and Charles' Law.
- 1.3 **AUXILIARY DEVICES.** Devices used with a meter to provide an adjustment of the meter reading, to permit obtaining special information, or to transmit information to a remote location.
- 1.4 **BADGE.** A permanent plate, affixed in a conspicuous place on a meter, containing basic meter information.
- 1.5 **BASE CONDITIONS.** The standard or base conditions of pressure and temperature for the volumetric measurement of natural gas. As used in this standard 14.73 psi (101.56 kPa) and 60°F (15.6°C) are established as the base pressure and temperature respectively to which all volumes are commonly referred. (Also known as STANDARD CONDITIONS)
- 1.6 **BOTTLE, CUBIC FOOT.** A specially constructed and calibrated bottle, usually immersion type, complete with an immersion tank containing a light oil of low vapor pressure, with the bottle suspended over the tank by means of a suitable cord and pulley so that the bottle may be immersed in the oil between two graduations, top and bottom. The bottle is constructed so that exactly 1.0 cubic foot of air is displaced when the bottle is immersed between the two marks. The calibration of the bottle must be traceable to the National Institute of Standards and Technology
- 1.7 **CAPACITY, RATED.** The flow rate in cubic feet per hour of 0.6 specific gravity gas delivered through the meter at an absolute pressure of 14.73 psi (101.5 kPa) and at 60°F (15.6°C) that results in an average differential pressure across the meter connections of 0.5-inch water column (125 Pa).
- 1.8 **CIRCLE(S), READING.** Graduated index circles with hands that register the accumulated volume of gas passed through the meter.
- 1.9 **CIRCLE(S), TEST.** A graduated circle provided with a rotating pointer (proving hand) on the meter index, used for testing the meter and for indicating gas flow. Also referred to as index test dial or proving circle.

- 1.10 **CIRCULAR CHARTS.** A circular chart is a piece of paper, or other suitable material, with graduated lines upon which a pen or stylus draws a record indicating the variables being measured.
- 1.11 **COMPRESSIBILITY.** Deviation of a real gas from the ideal gas laws relative to changes in pressure and temperature.
- 1.12 **CONNECTIONS, METER.** The integral parts of the meter designed for attachment to meter swivels, pipe or other piping components.
- 1.13 **CUBIC FOOT, METERED.** The quantity of gas that occupies 1 cubic foot when under pressure and temperature conditions existing in the meter.
- 1.14 **CUBIC FOOT, STANDARD.** That quantity of gas at base conditions occupying a volume of 1.0 cubic foot. (See BASE CONDITION)
- 1.15 **CUBIC METER, STANDARD.** That quantity of gas at base conditions occupying a volume of 1.0 cubic meter. (See BASE CONDITION)
- 1.16 **DIAPHRAGM.** A semi-flexible material anchored at its periphery, serving as a barrier between the volumetric chambers.
- 1.17 **FLOW RATE, PILOT.** A minimum flow rate that a meter is required to register with a prescribed accuracy.
- 1.18 **HUBS, METER.** Same as 1.12, CONNECTIONS, METER.
- 1.19 **INDEX, METER.** The device that displays the volume of gas that has passed through the meter.
- 1.20 **INDEX RATE.** The uncorrected flow rate calculated by dividing the registration by time.
- 1.21 **INDEX TEST DIAL.** See 1.9, CIRCLE(S), TEST.
- 1.22 **INDEX, CONSTANT PRESSURE COMPENSATING.** An index used in conjunction with a gas meter operated at a constant pressure, other than the contract base pressure, to indicate gas volume corrected to a contract base pressure.
- 1.23 **INDEX, TEMPERATURE COMPENSATING.** A meter index used to display corrected volume under flowing gas conditions to a base temperature, commonly 60°F (15.6°C).
- 1.24 **INDICATOR, DEMAND.** A device that indicates on a scale, chart or tape that maximum volume metered during a predetermined period of time.
- 1.25 **INDICATOR, VOLUME.** A component of an auxiliary device designed to indicate on a scale or chart, or both, the volume of gas passing through a meter in relation to time, temperature, pressure or any combination thereof.
- 1.26 **INSTRUMENT ADAPTOR PLATE.** An instrument adaptor plate is a mounting surface of suitable material mounted on and driven by a gas displacement meter. The instrument adaptor plate mounts between the meter and instrument and provides the correct instrument drive rotation and speed or displaced volume per revolution with respect to the meter output drive shaft.
- 1.27 **INSTRUMENT CHART DRIVE.** An instrument chart drive or clock is a timing device used to provide a time base for meter- or clock-driven recorders.

- 1.28 **INTEGRATING DEVICE.** A mechanism designed to automatically correct a gas volume-related input to some predetermined base conditions.
- 1.29 **LIFE TEST, ACCELERATED.** A test under controlled conditions simulating long-term operation designed to determine long-term maintenance and performance characteristics within a relatively short period of time.
- 1.30 **MAOP.** Maximum Allowable Operating Pressure equivalent to manufacturer's maximum working pressure.
- 1.31 **METER CAPACITY CLASS.** A capacity rated group designation for meters within different ranges of meter capacity. Rated capacity must equal or exceed the class designation, but be less than the next higher meter class.
- 1.32 **METER, DISPLACEMENT.** A meter that utilizes the principle of alternately filling and emptying compartments of known size and totals the number of times the cycle is accomplished, thereby indicating the volume of gas passing through the meter.
- 1.33 **METER, GAS.** A device for measuring the volume of flowing gas.
- 1.34 **METER, NEW.** A meter of all new materials as received from the manufacturer; never used in service.
- 1.35 **METER, NEW TYPE.** A gas meter sufficiently different in design or materials of construction (such as diaphragm material, cubic feet per tangent revolution, ratio of valve-to-diaphragm area, etc.) so affecting performance as to require qualification as a new-type meter under this standard.
- 1.36 **MILEAGE.** See 1.58, REGISTRATION.
- 1.37 **=MULTIPLIER, COMBINED PRESSURE AND TEMPERATURE.** Multiplication factor for correcting the maximum combined pressure and temperature conditions back to base conditions. Combined Pressure and Temperature Multiplier equals:

$$= \frac{520}{T_f + 460} \times \frac{P_g + P_a}{14.73}$$

Where:

$T_f$  = Flowing Gas Temperature, °F

$P_g$  = Meter Gauge Pressure, psig

$P_a$  = Atmospheric Pressure at the Meter Site, psia

- 1.38 **PERCENT ACCURACY.** The volume indicated by the meter ( $V_m$ ) divided by the volume indicated by the standard ( $V_s$ ), taken as a percentage.

$$= \frac{V_m}{V_s} \times 100$$

- 1.39 **PERCENT REGISTRATION.** See 1.1, ACCURACY, METER and Appendix D. Same as percent accuracy.
- 1.40 **PRESSURE DIFFERENTIAL.** The difference in pressure between two points in a flowing gas system.
- 1.41 **PRESSURE DROP.** The loss in pressure between two points in a fluid flow system.

- 1.42 **PRESSURE SYSTEM.** A pressure system is one that measures pressures above or below atmospheric pressure at any point in a closed system. A pressure-differential device will measure pressure differences within a pressure system or between two pressure systems.
- 1.43 **PRESSURE, ABSOLUTE.** Atmospheric pressure plus gauge pressure. Abbreviated as psia.
- 1.44 **PRESSURE, ATMOSPHERIC.** The pressure due to the weight of the atmosphere (air and water vapor) on the Earth's surface. The average absolute atmospheric pressure at sea level has been defined as 14.696 pounds force per square inch.
- 1.45 **PRESSURE, BASE.** An absolute pressure value to which measured gas volumes are corrected. If a purchase contract applies, the term is referred to as a contract base pressure. See also 1.5 BASE CONDITIONS.
- 1.46 **PRESSURE, GAUGE.** Pressure measured relative to atmospheric pressure. Abbreviated as psig.
- 1.47 **PRESSURE, METER.** The pressure in a meter under operating conditions. (Usually considered to be the meter's inlet pressure.)
- 1.48 **PROVER.** Device for measuring the accuracy of gas meter registration.
- 1.49 **PROVER, BELL.** Device for measuring the accuracy of gas meter registration. A calibrated cylindrical bell in which a quantity of air is collected over an oil seal.
- 1.50 **PROVER, CRITICAL FLOW.** See 1.53, SONIC FLOW PROVER.
- 1.51 **PROVER, LOW PRESSURE FLOW.** An apparatus utilizing an orifice for testing meters at low pressures by passing gas or air through both the orifice and meter and finally discharging it to the atmosphere. The time for a given quantity of gas to pass through the meter compared to the orifice standard time corrected for test conditions provides a measure of meter accuracy.
- 1.52 **PROVER, PISTON.** A mechanically sealed device that is calibrated to measure the volume of gas delivered to a meter.
- 1.53 **PROVER, SONIC FLOW.** Also referred to as SONIC NOZZLE PROVER or CRITICAL FLOW PROVER. A device employing either venturi, orifices or sonic nozzles as restrictions that is used for testing meters, usually at elevated pressures, by passing gas or air through both the meter and restriction and finally discharging it at a lower pressure that maintains sonic velocity (critical flow) through the restriction. The time for a given quantity of gas or air to pass through the meter compared to the restriction standard time corrected for test conditions provides a measure of meter accuracy.
- 1.54 **PROVER, TRANSFER.** A device for determining the accuracy of a meter under test by comparing its reading against the reading obtained from a calibrated reference meter connected in series with the meter under test.
- 1.55 **READING CIRCLES.** Those circles that indicate the volume of gas passed through the meter and are commonly used for billing purposes. (See 1.8 CIRCLE(S), READING)
- 1.56 **RECORDER, CHART.** An auxiliary device designed to record variations in pressure, temperature, and/or units of volume by means of a meter- or clock-driven chart.
- 1.57 **RECORDER, DEMAND.** An instrument that records gas flow rate as a function of time.
- 1.58 **REGISTRATION.** The indicated volume of gas passed through a meter.

- 1.59 **REMOTE METER READING DEVICES.** A device for a gas meter that provides or reproduces a reading of the meter index at a point remote from the meter. The reading may be displayed for visual observation, recorded in a portable device or transmitted to a distant point.
- 1.60 **SEAL.** A device designed to provide evidence of tampering with a meter.
- 1.61 **STANDARD CONDITIONS.** Same as 1.5, BASE CONDITIONS.
- 1.62 **STRAPPING.** A method of checking a bell prover by determining the relationship between displaced volume and linear movement of a bell prover by means of measuring scale length, bell circumference and displacement of the sealing liquid.
- 1.63 **TAPE, STRAPPING.** A metal tape calibrated to give a direct reading of diameter when applied to the circumference of a circular surface.
- 1.64 **TEMPERATURE SYSTEM.** A temperature system is one that indicates the hotness or coldness of the working medium. A temperature differential device measures temperature differences within a temperature system or between two temperature systems.
- 1.65 **TEMPERATURE, ABSOLUTE.** That temperature obtained in degrees Rankine by adding 459.67 degrees to a reading of a Fahrenheit thermometer or in degrees Kelvin by adding 273.15 degrees to that of a Celsius thermometer reading.
- 1.66 **TEMPERATURE, BASE.** A reference temperature to which measured gas volumes are corrected.
- 1.67 **TEMPERATURE, FLOWING.** The temperature of the gas at flowing conditions.
- 1.68 **TEMPERATURE, METERING.** The temperature of the gas in a meter at operating conditions. (Defined as the meter's outlet temperature.) See 6.1.6.3.

## PART II

### CONSTRUCTION REQUIREMENTS FOR QUALIFYING NEW-TYPE METERS

#### 2.1 SCOPE

This part establishes the construction requirements for qualification of a new-type meter.

#### 2.2 CONNECTION DIMENSIONS

The following standard specifications are included to provide for practical mounting and connecting interchangeability.

**2.2.1 Meter Capacity Class Connections.** Meter connections are established as shown in Table I, Top-Connected Meters, and Table II, Side-Connected Meters. Dimensions for connections listed below as standard, and other commonly used connections, are defined in Appendix A and Appendix B.

**TABLE I  
TOP-CONNECTED METERS**

| Meter Capacity Class | Connection Designation |                       | Center-to-Center Dimensions<br>(Dim. A., Fig.1) |
|----------------------|------------------------|-----------------------|-------------------------------------------------|
|                      | Male Customary (SI)    | Female Customary (SI) |                                                 |
| 500                  | 45Lt-1½" NPT (DN 40)   | 1½" NPT (DN 40)       | 11" (279.4 mm)                                  |
| 900                  | 45Lt-1½" NPT (DN 40)   | 1½" NPT (DN 40)       | 11" (279.4 mm)                                  |

**TABLE II  
SIDE-CONNECTED METERS**

| Meter Capacity Class | Connection Designation |                                          | Maximum Meter Base to Connection C<br>(Dim. D., Fig.2) |
|----------------------|------------------------|------------------------------------------|--------------------------------------------------------|
|                      | Female Customary (SI)  | Flanges Face-to-Face<br>(Dim. A. Fig. 2) |                                                        |
| 1400                 | 3" NPT (DN 80)         | 32" (813 mm)                             | 16" (406 mm)                                           |
| 3200                 | 4" NPT (DN 100)        | 37¾" (959 mm)                            | 18" (457 mm)                                           |
| 3500                 | 4" NPT (DN 100)        | 37¾" (959 mm)                            | 24" (610 mm)                                           |

All pipe threads specified in Tables I and II are in accordance with the "Standard for Pipe Threads (Except Dryseal), General Purpose (Inch)," ANSI/ASME B1.20.1.

#### 2.2.2 Connection Tolerances.

**2.2.2.1 Top Connections.** Meter connections shall conform to the tolerance limits specified in Figures 1 and 2.

It is the intent of these specifications that a suitable sealing medium be used between the meter connections and the swivels or pipes to which they will be attached.

2.2.2.2 Side Connections. Meters with side connections may be constructed either with integral flanges or other appropriate connections. These meters are to be limited in size such that, when flanges are used, their face-to-face dimensions will conform to Table II and the following:

- The center of the inlet flange shall coincide with the center of the outlet flange within 3/16 inch (4.8 mm). (Dimension B, Figure 3.)
- The flanges shall be both parallel with each other and perpendicular to an axis through the center of each, to within 2 degrees. (Dimensions C1 and C2, Figure 3.)

The maximum dimension between the center line of the meter connection and the base shall be as shown in Table II. (Dimension D, Figure 3.)

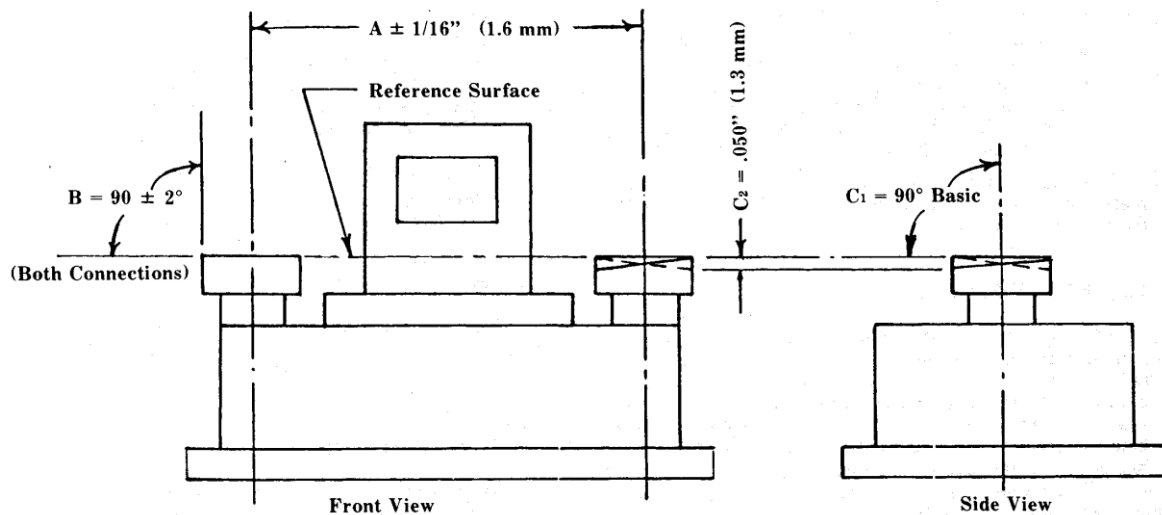


Figure 1. Top connection tolerance (male). See Section 2.2.2.1.

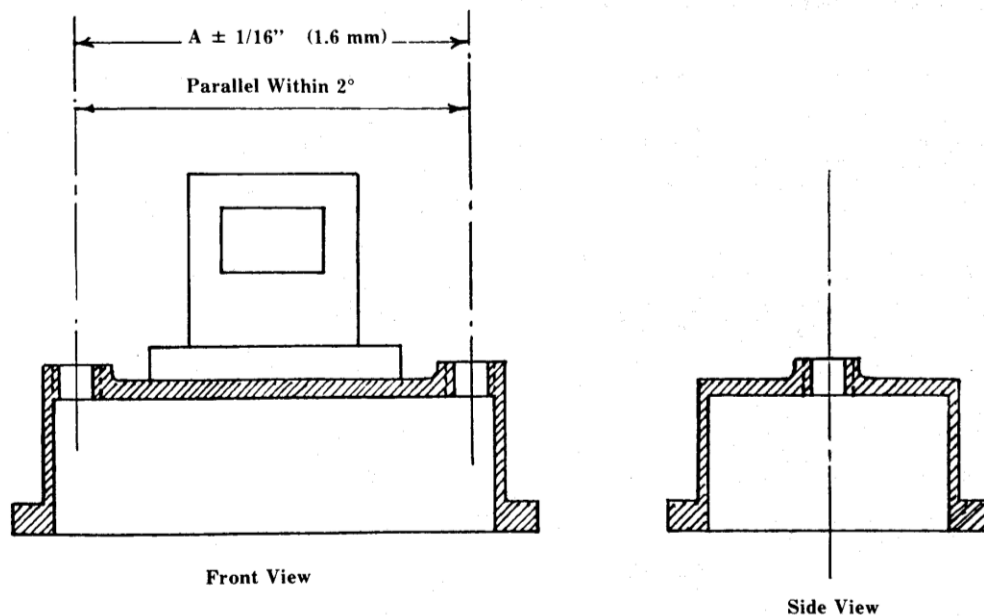


Figure 2. Top connection tolerances (female). See Section 2.2.2.1.

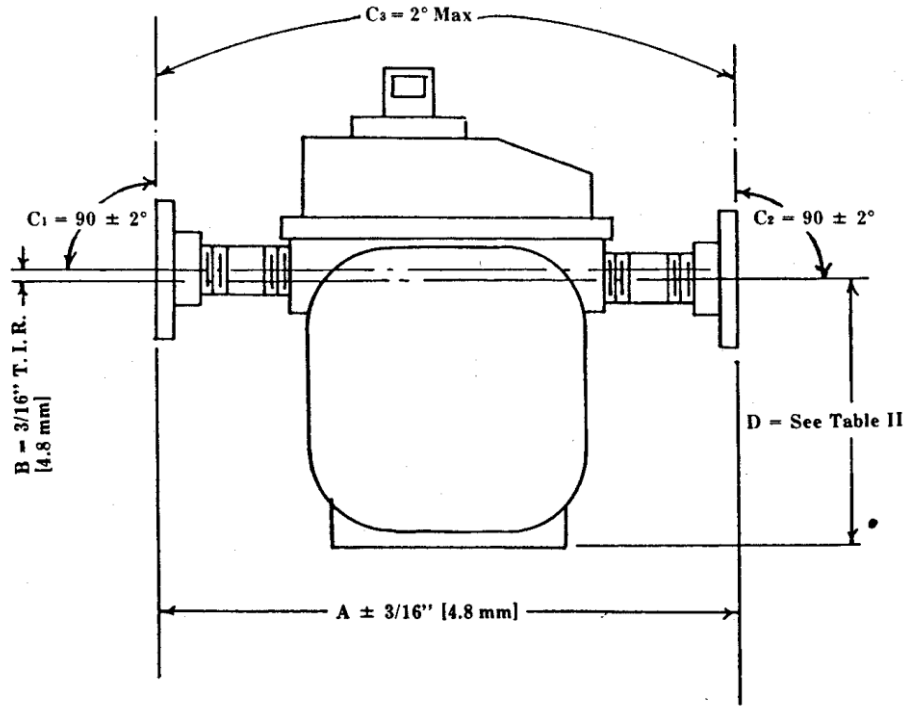


Figure 3. Side connection tolerances

## 2.3 METER IDENTIFICATION

2.3.1 Identification badges shall be readable from the same general position as the index.

### 2.3.2 Manufacturer's Identification.

The manufacturer's product shall contain identification information in a permanent and legible form which requires the information to remain affixed to or incorporated into the meter housing for the service life of the meter with the meter information recoverable by mechanical means through layers of paint, other forms of protective coatings, and corrosion. The information shall be readable from the same general position as the index and positioned in a manner to minimize damage during handling. Numbers shall be of the type shown in Figure 4. The meter serial number shall be at 0.25-inch (6.35 mm) high and shall be visible within an angle of 45 degrees from the perpendicular to the plane of the badge. Acceptable methods of markings can be embossing, etching; stamping and other competing technologies. The following information shall be contained on the badge:

- a) Meter Capacity Class.
- b) Manufacturer's name or trademark.
- c) Meter serial number.
- d) Year of manufacture.
- e) Maximum Allowable Operating Pressure (MAOP) rating.
- f) If the gas meter is a temperature-compensating model, the badge shall be a durable red color and shall state that the meter is "temperature compensating." The use of a badge of red color shall be limited to temperature-compensated meters.
- g) Meter capacity at a 0.5-inch (125 Pa) and 2.0 inch (500 Pa) water column pressure differential.

1234567890  
1234567890

*Figure 4. Suggested styles of numbers and characters on meter badge should follow fonts similar to Century Gothic (top) or Times New Roman (bottom). The intent is to maintain the openness of characters such as “3”, “6” and “9” to prevent confusion with other characters.*

#### **2.3.3 Purchaser's Badge.**

Space shall be provided on the meter for the attachment of a purchaser's badge and shall be of sufficient size to include the purchaser's meter identification information.

#### **2.3.4 Optional Identification.**

If additional meter identification is used (example: bar code, RFID, QR code, etc.), ensure the type and format are amenable to the purchaser. Refer to Appendix F for the preferred bar code standard for meters and auxiliary devices.

### **2.4 DIAPHRAGM IDENTIFICATION**

The diaphragm manufacturer's name or trademark, their designation of the type of material and the year of manufacture shall be visible on the diaphragm assembly.

### **2.5 INLET IDENTIFICATION**

The inlet connection shall be clearly and permanently identified.

### **2.6 PROTECTION OF METERS**

The meter inlet and outlet shall be protected to prevent entrance of foreign materials and to protect the threads during shipment or storage meeting an IP 53 level of protection per IEC 60529, IP Code.

### **2.7 SEALING**

For any part of the meter providing access to the meter interior or index, there shall be provision for sealing.

### **2.8 METER INDEX**

2.8.1 An indication of the volume units being measured shall appear in a prominent place on the index face. For example, cubic feet, cubic meters, etc.

2.8.2 The index face and markings shall be of contrasting colors to provide for ease of reading. The test circle shall have a white background with black indicators.

2.8.3 The index of a temperature-compensated meter shall indicate in red lettering on a white background that the meter is compensated to a base of 60°F (15.6°C).

2.8.4 Index and markings shall not be adversely affected by environmental conditions.

2.8.5 Meters shall be marked near the output shaft to indicate the direction of rotation and the volume per revolution.

### 2.8.6 Pointer-Type Circular Dial Reading Indexes.

2.8.6.1 Each reading circle shall be divided into 10 equal parts with division marks numbered from “0” to “9” The “0” division mark shall be located at the top of the circle. The reading circles shall be a minimum of 0.6-inch (15.2 mm) in diameter.

2.8.6.2 The index gearing shall provide for adjacent reading hands to rotate in opposite relative directions in a 10-to-1 ratio.

2.8.6.3 The fastest moving reading hand shall be located on the right of the index when viewed from the front of the index.

2.8.6.4 The fastest moving reading hand shall rotate in a clockwise direction and have a value per revolution equal to a multiple of 10 cubic feet (or metric equivalent).

2.8.6.5 The centers of the reading circles shall lie on a straight line or on the arc of a circle or ellipse and follow an uninterrupted reading sequence. Non-reading circles (such as proving or test hands) shall be distinct from reading circles.

2.8.6.6 Each reading circle shall be appropriately marked to indicate the number of volume units measured per complete revolution of the reading hand and shall be provided with an arrow indicating the direction of rotation of the reading hand.

2.8.6.7 On non-reading circles with “proving hand” or “test hands,” the volume per revolution shall be clearly indicated. The circle shall have 10 equally spaced divisions and an arrow shall be provided to show the direction of rotation. No numbers shall appear on subdivisions.

### 2.8.7 Direct Reading Indexes (Digital Type).

2.8.7.1 The digits of the counter shall be arranged to appear in a horizontal straight line that can be viewed easily through a cutout in the index face. The advance by one unit of a figure of any order must take place completely while the figure of an order immediately below passes through the last tenth of its course.

2.8.7.2 A permanent decimal point, zeroes or a multiplier shall appear on the index face to clearly indicate total volume units appearing on the counter. Example: Last digit on right side of counter indicates hundreds of volume units. Two permanent zeroes (“00”) or a multiplier of “× 100” will be shown in the line with and to the right side of the last digit to indicate total units.

2.8.7.3 An appropriate test hand or unit wheel shall be provided for proving a meter with a direct reading index and should meet the general requirements of 2.8.6.7

### 2.8.8 Constant-Pressure-Compensating Index.

2.8.8.1 The design of pressure-compensated pointer-type and direct-reading indexes shall comply with 2.8.6 and 2.8.7, except as noted below.

2.8.8.2 All compensating indexes shall be equipped with a test circle designed to indicate the uncorrected volume and shall comply with 2.8.2.