

American National Standard For
**Natural Gas Operated
Diaphragm Pumps**



First Edition - 2008

The standards set forth herein apply to the first edition of the Standard for Natural Gas Operated Diaphragm Pumps. Following their preparation by the supervising Technical Committee, they were accepted by the American National Standards Institute (ANSI), and subsequently approved.



Approved
August 25, 2008
American National Standards Institute, Inc.

Standard Developer

CSA AMERICA INC.
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Preface

This publication represents a basic standard for safe operation, substantial and durable construction, and acceptable performance of natural gas operated diaphragm pumps. It is the result of years of experience in the manufacture, testing, installation, maintenance, inspection and research on natural gas operated diaphragm pumps designed for the utilization of gas. There are risks of injury to persons inherent in some appliances that, if completely eliminated, would defeat the utility of the appliance. The provisions in this Standard are intended to reduce such risks while retaining the normal function of the appliance.

Nothing in this standard is to be considered in any way as indicating a measure of quality beyond compliance with the provisions it contains. It is designed to allow compliance of natural gas operated diaphragm pumps, the construction and performance of which may exceed the various provisions specified herein. In its preparation, full recognition has been given to possibilities of improvement through ingenuity of design. As progress takes place, revisions may become necessary. When they are believed desirable, recommendations should be forwarded to CSA America, Inc., 8501 East Pleasant Valley Road, Cleveland, Ohio 44131. A proposal form is provided in the back of this document.

Safe and satisfactory operation of natural gas operated diaphragm pumps depends to a great extent upon its proper installation, and it should be installed in accordance with the manufacturers' installation instructions, and local municipal building codes.

Users of this American National Standard are advised that the devices/products/activities within its scope may be subject to regulation at the Federal, state or local level. Users are strongly urged to investigate this possibility through appropriate channels. In the event of a conflict with this standard, the Federal, state or local regulation should be followed.

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EFFECTIVE DATE: An organization using this standard for product evaluation as a part of its certification program will normally establish the date by which all products certified by that organization should comply with this standard.

History Of The Development Of The Standard For Natural Gas Operated Diaphragm Pumps

(This History is informative and is not part of the standard.)

In 2001, CSA International developed CSA Requirement 2.01 for natural gas-operated diaphragm pumps, and was used for design certification testing of natural gas-operated diaphragm pumps by CSA International. In 2006, interest was indicated to develop a nationally recognized standard. CSA International relinquished its requirements to CSA America, Inc., to undertake the effort to develop a national standard. A working group of interested manufacturers was assembled to develop a standard based on the requirement.

In October 2006, CSA America informed the American National Standards Institute (ANSI) that it was undertaking the project of standards development for natural gas operated diaphragm pumps under its Committee Process. As work progressed, CSA America established a Technical Committee on Natural Gas Operated Diaphragm Pumps to oversee the development of the standard. The project was assigned the designation LC 6.

During its July 2007 meeting, the working group recommended to its Technical Committee that the draft Standard for Natural Gas Operated Diaphragm Pumps be distributed for review and comment.

During its August 2007 meeting, the Technical Committee accepted the recommendation of the working group and adopted the draft standard for distribution for review and comment. The draft standard was subsequently distributed for review and comment during November 2007.

At its May 2008 meeting, the Technical Committee considered comments received during the review and comment period and agreed to editorially revise the draft standard. The Technical Committee then adopted the revised draft standard for submittal to ANSI for approval.

This, the first edition of the Standard for Natural Gas Operated Diaphragm Pumps, was approved by the American National Standards Institute on August 25, 2008.

The following identifies the designation and year of the standard.

ANSI LC 6–2008

Natural Gas Diaphragm Pump Technical Committee

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Contents

Page

Part I Construction

1.1	Scope	1
1.2	General	1
1.3	Equipment And Data To Be Furnished By The Manufacturer	2
1.4	Assembly	2
1.5	Connections	2
1.6	Bolts, Nuts And Screws	3
1.7	Materials	3
1.8	Instructions And Service Manuals	4
1.9	Marking	5

Part II Performance

2.1	General	7
2.2	Test Gases	7
2.3	Strength And Deformation	7
2.4	Leakage	9
2.5	Continued Operation	10
2.6	Elastomeric Materials	10
2.7	Marking Material Adhesion And Legibility	12

Tables

Table I	Minimum Thread Length For American National Standard Pipe Threads	14
Table II	Minimum Thread Length For British Standard Pipe Threads	14
Table III	Turning Effort	15
Table IV	Static Load For Bending Moment	15

Part III Manufacturing And Production Tests 17

EXHIBIT A	List of Reference Standards	19
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Part IV Definitions 21

APPENDIX A	Table of Conversion Factors	23
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NOTE

This standard contains SI (Metric) equivalents to the yard/pound quantities, the purpose being to allow the standard to be used in SI (Metric) units. (Standard for use of the International System of Units (SI): The Modern Metric System, IEEE/ASTM SI 10 or Metric Practice Guide, CAN/CSA Z234.1 are used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and an equivalent value in other units, the first stated is to be regarded as the requirement. The given equivalent value may be approximate. If a value for a measurement and an equivalent value in other units, are both specified as a quoted marking requirement, the first stated unit, or both shall be provided.

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American National Standard For Natural Gas Operated Diaphragm Pumps

Part I: Construction

1.1 Scope

1.1.1

This Standard applies to natural gas operated diaphragm pumps, herein after referred to as pumps, which are constructed entirely of new, unused parts and materials.

1.1.2

This Standard applies to pumps powered by pressurized natural gas, either wellhead or utility grade, pumping process fluids as specified by the manufacturer. (See Part IV, Definitions.)

1.1.3

This Standard applies to pumps with a maximum rated operating gas pressure not exceeding 150 psi (10.342 Bar).

1.1.4

Pumps complying with the provisions of this Standard shall be considered as having an operating ambient temperature range of 32°F (0°C) to 125°F (51.5°C), unless a lower minimum allowable ambient temperature, or a higher maximum allowable ambient temperature, or both, are specified by the manufacturer, (see 2.1.2).

1.1.5

If a value for measurement as given in this Standard is followed by an equivalent value in other units, the first stated value is to be regarded as the specification.

1.1.6

All references to “psi”(“Bar”) throughout this Standard are to be considered gauge pressure, unless otherwise specified.

1.2 General

1.2.1

The construction of parts not covered by this Standard shall be in accordance with reasonable concepts of safety, substantiality and durability.

All specifications as to construction set forth herein may be satisfied by the construction actually prescribed or such other construction as will provide at least equivalent performance.

1.2.2

The mechanisms of pumps shall be protected by substantial enclosures so as to prevent interference with the safe operation of the pumps.

1.2.3

The pump design must have provisions for the connection of a grounding conductor.

1.2.4

The pump shall be constructed to prevent the accumulation of static electric charge. This provision shall be deemed met when the electrical resistance between the point of connection of the equipment grounding means and any other metal part of the pump is not more than one (1) mega-ohms.

Method of Test

Resistance shall be checked using a mega-ohms meter having an applied potential of 500 volts DC with a 20 mega-ohms scale. The resulting resistance shall not exceed one (1) mega-ohms between the point of connection of the equipment grounding means and each metal part.

1.3 Equipment And Data To Be Furnished By The Manufacturer

The manufacturer shall furnish the following equipment and data for the use of the testing agency for the purpose of listing equipment under this Standard:

- a. Representative production samples, as specified by the testing agency;
- b. Drawings, blueprints, instructions and service manuals, or photographs which describe each pump model as specified by the testing agency;
- c. Maximum operating pressure (in pounds per square inch) (see 1.1.3);
- d. Operating ambient temperature range (see 1.1.4 and 2.1.2); and
- e. Specification of the type of natural gas for which the pump is intended, such as one of the following: "sweet," "sour," or "sweet and sour."

1.4 Assembly

The construction of pumps which can be field disassembled without the use of special tools shall be such that either:

- a. The parts of the pump cannot be readily reassembled improperly in a manner which could result in an unsafe condition; or
- b. The standard fasteners are covered with a sealing means to discourage disassembly. The sealing means shall be suitable for exposure to the ambient temperature range specified by the manufacturer.

This provision does not apply to parts of a pump intended for field replacement or servicing (see 1.8.g).

1.5 Connections

1.5.1

When pipe threads are used, connections shall be provided in accordance with the Standard for *Pipe Threads, General Purpose (Inch)*, ANSI/ASME B1.20.1, or the Specification for *Pipe Threads for Tubes and Fittings Where Pressure-Tight Joints are Made on the Threads*, BS EN 10226-1, and BS EN 10226-2.

1.5.2

Pipe threads, when provided, shall have a thread length not less than the value shown in Table I, Minimum Thread Length For American National Standard Pipe Threads, or Table II, Minimum Thread Length For British Standard Pipe Threads.

1.5.3

Pumps shall be designed to accept a wrench for use in assembly and disassembly to piping.

1.5.4

Inlet and outlet gas connections shall be designed so that when a pipe which is threaded two threads beyond standard (for the size in question) is run into the threaded portion of a pump body, it will not adversely affect the operation of the pump.

1.5.5

Connections for attachment to semirigid tubing shall comply with SAE specifications for automotive tube fittings as contained in the *SAE Handbook*.

1.5.6

Standard cast iron flange connections, when provided, shall be constructed in accordance with the dimensional specifications for 125 lb (56.7 kg) cast iron flanges of the Standard for *Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, ANSI/ASME B16.1*.

Standard steel flange connections, when provided, shall be constructed in accordance with the dimensional specifications in the Standard for *Pipe Flanges and Flanged Fittings: NPS 1/2 through 24, ANSI/ASME B16.5*.

Aluminum flange connections, when provided, shall be compatible with the dimensional specifications for 125 lb (56.7 kg) cast iron flanges of the Standard for *Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800, ANSI/ASME B16.1*.

1.6 Bolts, Nuts And Screws

Bolts, nuts, machine screws and other threaded parts used in covers, housings, casings and external mounting brackets shall have threads conforming to the Standard for *Unified Inch Screw Threads (UN and UNR Thread Form), ANSI/ASME B1.1*; the Standard for *ISO General Purpose Screw Threads — Basic Profile, ISO 68*; or the Standard for *ISO General Purpose Metric Screw Threads — General Plan, ISO 261*, as applicable.

1.7 Materials

1.7.1

The manufacturer shall supply evidence acceptable to the testing agency that all materials have been found to be suitable for their intended usage. Test data based on ASTM or other appropriate test procedures, certifications, or historical data may be submitted for this purpose. The evidence shall show that the materials have been evaluated, as appropriate for resistance to moisture, corrosion and the effects of fuel gases, including sulfur compounds therein, and that nonmetallic diaphragm and seal materials are suitably resistant to the effects of ozone.

1.7.2

For pumps containing parts intended for potable water, the manufacturer shall supply evidence satisfactory to the testing agency, that the materials used as protective coatings are suitable for the service, particularly with respect to toxicity, solubility, brittleness and temperature limits. Evidence of current certification under the Standard for *Plastic Piping System Components and Related Materials, ANSI NSF 14*, with appropriate end use, shall be deemed acceptable.

1.7.3

Materials, or coatings of materials provided with protective coatings, for automatic mechanisms and current-carrying components exposed to fuel gases shall be resistant to moisture, sulfur compounds, corrosion and the effects of such gases.

1.7.4

Pumps designed for use with sour natural gas (see Part IV, Definitions) which utilize parts containing more than 65 percent copper and are exposed to fuel gas (other than cast or forged bodies) shall be protected from the effects of sulfur-bearing compounds.

1.7.5

Control and pump bodies intended to maintain gas tightness to the atmosphere shall be made of materials having a melting point of not less than 800°F (427°C). Shaft seals, gaskets and diaphragms shall be exempt from this provision.

1.8 Instructions And Service Manuals

Complete instructions covering installation, proper operation and servicing shall be furnished by the manufacturer.

Included in these instructions shall be:

- a. Maximum rated operating gas pressure;
- b. Maximum and minimum ambient temperatures (see 1.1.4 and 2.1.2) in which the pump is intended to operate;
- c. Specification and definition of the type of natural gas for which the pump is intended, such as one of the following: "sweet," "sour," or "sweet and sour" (see Part IV, Definitions);
- d. The process fluid(s) for which the pump has been designed;
- e. Flow capacity of the process fluid;
- f. Required operating gas flow and pressure to obtain process fluid flow;
- g. The identification of any parts which the manufacturer specifies as replacement service parts and instructions for the installation of such parts; and
- h. The following statements:

"Caution: This pump must be electrically grounded using the grounding conductor provided. Improper grounding can cause improper and dangerous operation."

"Caution: The gas outlet of this pump must be vented to a safe location in accordance with local codes, or in the absence of local codes, an industry or nationally recognized code having jurisdiction over the specific installation."