IAPMO IGC 429-20yy

PUBLIC REVIEW DRAFT

Industry Standard for

Bladder Tank Condition Monitoring Devices (for Plumbing Systems) Draft

IAPMO Standard

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Preface

This is the 1st edition of IAPMO IGC 429, *Pressure Monitoring and Alert Systems*.

This Standard was developed by the IAPMO Standards Review Committee (SRC) in accordance with the policies and procedures regulating IAPMO industry standards development, Policy S-001, Standards Development Process. This Standard was approved as an IAPMO Industry Standard on Month DD, YYYY.

Notes:

(1) The use of the singular does not exclude the plural (and vice versa) when the sense allows.

(2) The use of IAPMO Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

(3) This standard was developed using an open process and in accordance with IAPMO Standards Policy S-001, Standards Development Process*, which is available on the IAPMO Standards website (www.IAPMOstandards.org).*

(4) During its development, this Standard was made available for public review, thus providing an opportunity for additional input from stakeholders from industry, academia, regulatory agencies, and the public at large. Upon closing of public review, all comments received were duly considered and resolved by the IAPMO Standards Review Committee.

(5) This Standard was developed in accordance with the principles of consensus, which is defined as substantial agreement; consensus implies much more than a simple majority, but not necessarily unanimity. It is consistent with this definition that a member of the IAPMO Standards Review Committee might not be in full agreement with all sections of this Standard.

(6) Although the intended primary application of this Standard is stated in its scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

(7) IAPMO Standards are subject to periodic review and suggestions for their improvement will be referred to the IAPMO Standards Review Committee. To submit a proposal for change to this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 4755 East Philadelphia Street, Ontario, California, 91761, and include "Proposal for change" in the subject line:

- *(a) standard designation (number);*
- *(b) relevant section, table, or figure number, as applicable;*
- *(c) wording of the proposed change, tracking the changes between the original and the proposed wording; and*
- *(d) rationale for the change.*

(8) Requests for interpretation should be clear and unambiguous. To submit a request for interpretation of this Standard, you may send the following information to the International Association of Plumbing and Mechanical Officials, Attention Standards Department, at standards@IAPMOstandards.org or, alternatively, at 4755 East Philadelphia Street, Ontario, California, 91761, and include "Request for interpretation" in the subject line:

- *(a) the edition of the standard for which the interpretation is being requested;*
- *(b) the definition of the problem, making reference to the specific section and, when appropriate, an illustrative sketch explaining the question;*
- *(c) an explanation of circumstances surrounding the actual field conditions; and*
- *(d) the request for interpretation phrased in such a way that a "yes" or "no" answer will address the issue.*

(9) IAPMO does not "approve", "rate", or endorse any item, construction, proprietary device, or activity.

(10) IAPMO does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this Standard and does not undertake to insure anyone utilizing this Standard against liability for infringement of any applicable patents, nor assumes any such liability. Users of this Standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their responsibility.

(11) Participation by federal or state agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this Standard.

(12) Proposals for amendments to this Standard will be processed in accordance with the standards-writing procedures of IAPMO industry standards development, Policy S-001, Standards Development Process.

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IAPMO IGC 429-20yy
Bladder Tank Condition Monitoring Devices

1 Scope

1.1 Scope

This Standard covers devices intended to monitor pressure-related operating conditions of bladder-type tanks installed in potable and non-potable plumbing systems. These devices are intended to detect abnormal operating conditions associated with loss of air charge, ineffective pressure regulation, or bladder malfunction resulting from repeated thermal expansion and contraction within a plumbing system, and to provide a local or remote alert to the user.

This standard specifies requirements for materials, physical characteristics, performance testing, and markings.

This Standard does not establish design-specific methods of detection or communication and is intended to remain technology-agnostic.

1.2 Alternative Materials

The requirements of this Standard are not intended to prevent the use of alternative materials or methods of construction provided such alternatives meet the intent and requirements of this Standard.

1.3 Terminology

In this Standard,

(a) "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy to comply with the Standard;
(b) "should" is used to express a recommendation, but not a requirement;
(c) "may" is used to express an option or something permissible within the scope of the Standard; and
(d) "can" is used to express a possibility or a capability.

Notes accompanying sections of the Standard do not specify requirements or alternative requirements; their purpose is to separate explanatory or informative material from the text. Notes to tables and figures are considered part of the table or figure and can be written as requirements.

1.4 Units of Measurement

SI units are the primary units of record in global commerce. In this Standard, the inch/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application, but each unit system is to be used independently. All references to gallons are to U.S. gallons.

2 Reference Publications

This Standard refers to the following publications and, where such reference is made, it shall be to the current edition of those publications, including all amendments published thereto.

3 Definitions and Abbreviations

3.1 Definitions

The following definitions shall apply in this Standard:

Alert Signal — a local or remote audible, visual or electronic notification that informs the user of a detected abnormal condition

Bladder Failure — a condition in which the bladder is no longer capable of maintaining separation between air and water, resulting in loss of effective air charge and reduced or eliminated expansion capacity

Bladder Tank — a pressure vessel incorporating a flexible bladder or diaphragm that separates system water from a compressed air charge to accommodate thermal expansion

Condition Monitoring Device — a sensor-based system that continuously tracks pressure and moisture conditions associated with bladder tank performance and alerts abnormal operating conditions

Diaphragm — a flexible, pressure-responsive membrane generally made pf elastomeric material used to separate liquid from air.

Loss of Air Charge — a condition in which the compressed air volume within a bladder tank is diminished or displaced by water due to leakage, permeation, or bladder failure

Manufacturer's rated pressure — the nominal pressure at which the device is intended to operate

Normal operating pressure — the midpoint of the normal operating range

4 General Requirements

4.1 General

Devices covered by this Standard shall be designed for installation on or in proximity to bladder tanks.

4.2 Functional Performance

The device shall be capable of detecting pressure-related conditions indicative of one or more of the following:
a) loss of air charge;
b) bladder failure by sensing water or loss of expansion capacity;
c) sustained system pressures exceeding normal operating ranges during thermal expansion events
Detection methods, thresholds, and algorithms may be determined by the manufacturer and are not prescribed by this Standard. Detection shall be based system behavior indicative of the bladder tank conditions and not solely on pressure thresholds.

4.3 Electrical Requirements

4.3.1 Devices incorporating electrical components shall comply with applicable UL or CSA standards.

4.4 Operating Conditions

Maximum operating pressure should be greater than 552 kPa (80 psi)
Temperature range shall be 3.9° C to 66° C (39° F to 150° F)

4.5 Low power indication

If the device is battery powered, it shall be provided with a low-power indication

5 Testing Requirements

5.1 General

5.1.1 Test Specimen

Test specimens shall be production-representative condition monitoring devices, including all components necessary for installation and operation as specified by the manufacturer (e.g., sensor assembly, alarm module, mounting hardware, and power source).

5.1.2 Conditioning

Unless otherwise specified, test specimens shall be conditioned at an ambient temperature of 23 ± 2 °C (73 ± 4 °F) for a minimum of 24 hours prior to testing.

5.1.3 Test setup

Test specimens shall be installed in accordance with the manufacturer's installation instructions on a test fixture that replicates the relevant pressure interface and mounting conditions.

5.1.4 Test Apparatus

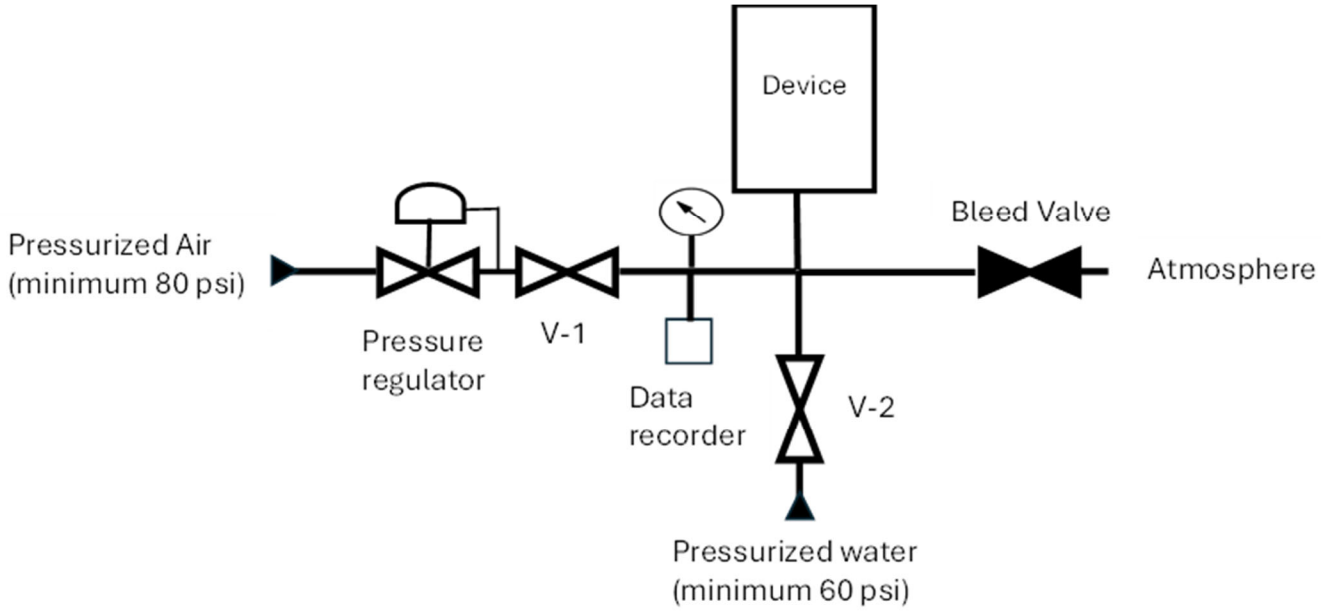

Figure 1

Note: Additional pressurized lines may be added for testing to section 5.2

5.2 Pressure Test

5.2.1 Purpose

This test evaluates ability of the device to hold the maximum pressure without leakage (pressure loss) or fracture.

5.2.2 Test Procedure

1. Install the device to an air pressure source
2. Pressurize the device to the greater of
   (a) 1.5 times the manufacturer's rated pressure or
   (b) 827 kPa (120 psi)
3. Hold pressure for 15 minutes.
4. Observe for leaks or pressure drop.

5.2.2 Performance Requirement

Any leaks or loss of pressure shall be considered a failure.

5.3 Normal Cycling Nuisance Activation Test

5.3.1 Purpose

This test evaluates whether the device avoids nuisance activation during typical thermal expansion and pressure cycling conditions expected in plumbing systems.

5.3.2 Test Procedure

1. Install the specimen per Figure 1 in accordance with the manufacturer's instructions.
2. With V-2 and the bleed Valve close, Open V-1 and adjust the pressure to 345 kPa ± 13.8 kPa (50 psi ± 2 psi) to establish a baseline pressure (representative of normal domestic supply pressure).
3. To simulate thermal expansion events and normal draw/recovery behavior, Cycle pressure ± 69 kPa (10 psi) above and below baseline with a cycle rate of 5 minutes ± 1 minute per each pressure cycle for minimum duration of 24 hours. (Minimum of 290 cycles)
4. Record system pressure profiles and any alert events as evidence of a pressure spike above the setpoint value.

5.3.3 Performance Requirement

The device shall not generate an abnormal condition alert during the normal cycling profile.

5.4 Loss of Air Charge Detection Test

5.4.1 Purpose

This test evaluates whether the device provides an alert when the expansion tank has lost effective air charge.

5.4.2 Test Procedure

1. Install the specimen per Figure 1. Set the low pressure alarm on the device to 30 psi or the manufacturer's specified setpoint. Note: some devices may have a pre-set alarm psi
2. With V-2 and the bleed valve closed, Open V-1 and adjust the pressure to 50 psi ± 2 psi
3. Introduce a loss-of-air-charge condition by cracking open the bleed valve and slowly reducing pressure until the alarm initiates.
4. Record the pressure at which the device alarms.
5. Shut the bleed valve and slowly increase the pressure to 50 psi ± 2 psi.
6. Record the pressure at which the device alarm resets.
   Note: Some devices may require a manual alarm reset

5.4.3 Performance Requirement

The device shall generate an alert signal when an alarm condition is present within ± 2 psi of the setpoint.

5.5 Alarm Setpoint Verification for High Pressure Alarm (if applicable)

5.5.1 Purpose

This test evaluates whether the device provides an alert when the expansion experiences a high pressure condition

5.5.2 Test Procedure

1. Install the specimen per Figure 1. Set the low pressure alarm on the device to 70 psi or the manufacturer's specified setpoint. Note: some devices may have a pre-set alarm psi
2. With V-2 and the bleed valve closed, Open V-1 and adjust the pressure to 50 psi ± 2 psi
3. Slowly increase pressure until the alarm initiates.
4. Record the pressure at which the device alarms.
5. Shut V-1 and open the bleed valve to slowly decrease the pressure to 50 psi ± 2 psi.
6. Record the pressure at which the device alarm resets.

Note: Some devices may require a manual alarm reset

5.5.3 Performance Requirement

The device shall generate an alert signal when an alarm condition is present within ± 2 psi of the setpoint.

The device shall reset when restoring pressure at a pressure 10 psi below the setpoint.

5.6 Bladder Failure Simulation Test

5.6.1 Purpose

This test evaluates whether the device provides an alert when the bladder no longer maintains separation between air and water.

5.6.2 Test Procedure

1. Install the specimen per Figure 1.
2. With V-2 and the bleed valve closed, Open V-1 and adjust the pressure to 50 psi ± 2 psi.
3. Close V-1 and slowly open V-2.
4. Observe for 5 minutes if an alarm occurs.

5.6.3 Performance Requirement

Failure of the device to generate an alert signal when V-2 is open constitutes a failure.

5.7 Power Source and Low-Power Indication Test (If Applicable)

5.7.1 Purpose

Verify that the device will alarm during a low voltage condition occurs

5.7.1 Test procedure

1. Remove battery
2. Using an adjustable voltage source, input the nominal voltage as specified by the manufacturer
3. Slowly Adjust the voltage source, reducing the voltage until an alarm occurs
4. Record the voltage at which the alarm occurs

5.7.3 Performance Requirement

Failure of the device to alarm when voltage is reduced shall constitute a failure.

6 Markings and Accompanying Literature

6.1 Markings

Pressure monitoring and alert devices complying with this Standard shall be marked with the:

(a) manufacturer's name or trademark;
(b) model number;
(c) IAPMO standard designation (i.e., “IAPMO IGC 429”);
(d) intended service, where applicable (e.g., “potable water” or “non-potable applications only”); and

6.2 Visibility

Markings shall be permanent, legible, and visible after installation.

6.3 Installation Instructions

Pressure monitoring and alert devices shall be accompanied by instructions for their installation, care and maintenance, and repair, specifying at minimum the following:

(a) requirements for battery replacement, and
(b) if the setpoint(s) is/are adjustable, the procedure for setting the alarm setpoint(s)

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