

IAPMO IGC 402-2024



PUBLIC REVIEW DRAFT

Industry Standard for

Residential Ozone Generators for Pools and Spas



IAPMO Standard

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Preface

This is the first edition of IAPMO IGC 402, Residential Ozone Generators for Pools, Spas, and Hot Tubs.

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 Day, 2024**.

Notes:

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- (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.*
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 - (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.*
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- (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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M. Durfee	Chief Building Official - Retired Saratoga Springs, Utah, USA	<i>Vice-Chair</i>
R. Garcia	Senior Mechanical Inspector San Diego, California, USA	
E. Gilbreath	Plumbing Inspector, King County Public Health Puyallup, Washington	
D. Gordon	Plumbing Inspector San Francisco, California, USA	
G. Hile	Chief of Inspections, Municipality of Anchorage – Retired Anchorage, Alaska, USA	
G. Snider	Plumbing Section Supervisor, City of Surrey Surrey, British Columbia, CAN	
M. Wang	Plan Check, City of Los Angeles Monterey Park, California, USA	
S. Choe	IAPMO Farmington Hills, Michigan, USA	<i>Staff Liaison</i>
H. Aguilar	IAPMO Ontario, California, USA	<i>Secretary</i>

IAPMO IGC 402-202y

Residential Ozone Generators for Pools and Spas

1 Scope

1.1 General

This Standard covers residential ozone generators for pools, spas, and hot tubs and specifies requirements for materials, construction, performance, testing, and markings.

1.2 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.

1.3 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.

APHA/AWWA/WEF

Standard Methods for the Examination of Water and Wastewater

NSF

NSF/ANSI/CAN 50 Equipment and Chemicals, For Swimming Pools, Spas, Hot Tubs, and Other Recreational Water Facilities.

UL
UL 1563
Electric Spas, Equipment Assemblies, and Associated Equipment

3 Definitions and Abbreviations

The following definitions shall apply in this Standard:

3.1 Definitions

Ozone – an unstable and oxidizing gas having three oxygen atoms

3.2 Abbreviations

CPVC – chlorinated polyvinyl chloride

PTFE – polytetrafluoroethylene

PVC – polyvinyl chloride

PVDF – Polyvinylidene fluoride

TDS – total dissolved solids

4 General Requirements

4.1 Materials

Materials that are in contact with ozone, prior to injection into the main circulation line, shall be resistant to ozone gas.

Acceptable materials for direct ozone contact in residential systems:

- Stainless Steel, 304 and 306
- Superalloys
- Aluminum
- Titanium
- Perfluoro resins
- PTFE
- PVC
- CPVC
- PVDF
- Ceramic
- Glass

4.1.1 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 and can be shown to be ozone resistant.

4.1.2 Materials not specifically covered by this standard shall not sustain damage with routine use and maintenance and be corrosion resistant to ozone. The product must meet the performance requirements of this Standard.

4.2 Material Toxicity

Materials of an ozone generator and its components that are in direct contact with the recirculated water shall comply with the applicable requirements of NSF/ANSI/CAN 50 for material toxicology.

4.3 Electrical Safety

Residential ozone generators shall comply with the requirements of UL 1563.

4.4 Ozone Off Gassing

The ozone system must demonstrate an ozone off gas level that is in compliance with OSHA standards. The current most stringent allowable amount is 0.08ppm (time weighted average over 8 hours). This measurement would be taken after contact time in the water, at the first location a human could encounter the residual ozone gas.

4.5 Interlock

The ozone generator shall be equipped with an interlock to stop ozone production when circulation has stopped.

4.6 Disinfection Efficacy

Residential ozone generators shall be tested to Section 5.1 of this standard.

4.7 Working Pressure

Residential ozone generator and its wetted components shall be capable of withstanding a minimum of 207 ± 7 kPa (30 ± 1 psi) and tested in accordance with Section 5.2.

4.8 Vacuum Pressure

Residential ozone generator and its components that are under vacuum shall be capable of withstanding a minimum vacuum of 25 in Hg and tested in accordance with Section 5.3.

5 Testing Requirements

5.1 Disinfection efficacy for residential ozone generators

The purpose of this test is to determine the disinfection efficacy of a residential ozone system pool or spa use.

5.1.2 Water parameters

Temperature	26 + 3°C (80 ± 5°F)
Free available chlorine	0 ppm
pH	7.2 – 7.6
Alkalinity	60 – 100 ppm
Hardness	200 – 400 ppm
TDS	refer to manufacturers use instructions
Turbidity	< 2.0 NTU

5.1.3 Test Procedure

Use the water parameters as detailed in Section 5.1.2 and the test method outlined in NSF/ANSI/CAN 50, Annex N-8.1. *Enterococcus faecium* (ATCC #6569) and *Pseudomonas aeruginosa* (ATCC #27313) shall be used for the challenge organisms.

5.1.4 Analysis of samples

Test samples shall be analyzed using Standard Methods for the Examination of Water and Wastewater.

5.1.5 Performance Requirements

The ozone generator shall provide a minimum of 1 log reduction of *E. faecium* and *P. aeruginosa* (ATCC #27313). The manufacturer shall display the achieved log reduction on the data plate.

5.2 Hydrostatic Pressure

The purpose of this test is to verify the ozone generator and its components can withstand a minimum working pressure of 207 ± 7 kPa (30 ± 1 psi)

5.2.1 Test Procedure

The hydrostatic pressure test shall be performed as follows.

- Install the ozone generator and its components to the pressure test rig.
- Fill the unit with water at 26 + 3°C (80 ± 5°F) and completely bleed off the air.
- Apply a hydrostatic pressure of 310 ± 7 kPa (45 ± 1 psi) for five minutes ± 30 seconds.
- Release the pressure and inspect the unit.

5.2.2 Performance Requirements

There shall be no visible leaking, damage, or permanent deformation of the components under pressure.

5.3 Vacuum Pressure

The purpose of this test is to verify the ozone generator and its components that are under vacuum and withstand a negative pressure of 25 in Hg.

5.3.1 Test Procedure

The vacuum pressure test shall be performed as follows.

- Install the ozone generator and its components to the pressure test rig.

- (b) Connect the system to a vacuum source.
- (c) Apply a vacuum of 25 ± 1 in Hg (85 ± 3.4 kPa).
- (d) Maintain the vacuum pressure for 5 minutes.

5.3.1 Performance Requirements

There shall be no visible leaking, damage, or permanent deformation of the system and its components.

6 Markings and Accompanying Literature

6.1 Markings

Residential ozone generators shall be marked with the following:

- (a) manufacturer's name or trademark;
- (b) model number;
- (c) standard designation (i.e., "IAPMO IGC 402");
- (d) maximum flow rate; and
- (e) log reduction performance, Section 5.1.

6.2 Visibility

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

6.3 Installation and Operation Instructions

Residential ozone generators shall be accompanied by instructions for their installation and operation. The instructions shall include maximum flow rate and pipe or tube size of the ozone generator.



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