

**INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS**

IAPMO GUIDE CRITERIA

FOR

CLOSED-LOOP BIOLOGICAL WASTEWATER SYSTEM

IAPMO IGC 213-2005 (R2014)

1. PURPOSE

- 1.1** The purpose of this standard is to supply manufacturers, plumbing enforcement agencies and others with the criteria and test procedures for determining the proper performance of the appliance.
- 1.2** The provisions of this standard are not intended to prevent the use of any alternate material or method of construction, provided any such alternate meets the intent and requirements of this document, and changes are amended to this standard.

2. SCOPE

- 2.1** Closed-Loop Biological Wastewater Systems (CBWS) shall be designed to break down organic materials in effluent, and to release the products as simple-molecule, odorless, non-flammable gases.
- 2.2** This standard covers minimum requirements for Closed-Loop Biological Wastewater Systems, and prescribes minimum test requirements for the performance of CBWS, together with methods of marking and identification.

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3. REFERENCED STANDARDS

3.1 All standards referenced herein shall be the current edition of the standards.

ASME A112.19.2	Vitreous China Plumbing Fixtures
ASME A112.19.3M	Stainless Steel Plumbing Fixtures
ASTM D 1946	Analysis of Reformed Gas by Gas Chromatography
CFR 60A 15/16	Determination of Total Reduced Sulfur Emissions
EPA TO-15	Determination of Volatile Organic Compounds in Air
IAPMO PS 61	Fabricated Stainless Steel Security Water Closets
SM 2540 D	Total Suspended Solids Dried at 103-105°C from Standard Methods for the Examination of Water and Waste, 20 th Ed.
SM 5210 B	5-Day BOD Test from Standard Methods for the Examination of Water and Waste, 20 th Ed.
UL 778	Motor-Operated Water Pumps
UL 935	Fluorescent-Lamp Ballasts
UL 1951	Electrical Plumbing Accessories

4. DEFINITIONS

- 4.1** Aeration chamber – an aerated tank with an internal environment designed to maximize the effective break-down of solid waste particles into liquid form.
- 4.2** Biological oxygen demand (BOD) – an indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste.
- 4.3** Bio-reactor – an enclosure designed to maximize the waste-destruction efficiency of the useful bacteria, and the conversion of waste products into gaseous products.
- 4.4** Closed-loop biological wastewater system (CBWS) – a system designed to break down

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the organic components of a liquid stream, and to release the by-products as simple-molecule, odorless, non-flammable gases.

- 4.5 **Total Suspended Solids (TSS)** – A measure of the suspended solids (Small particles of solid pollutants that float on the surface of, or are suspended in, sewage or other liquids.) in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids."

5. GENERAL REQUIREMENTS

- 5.1 **Materials.** The construction of the wetted surfaces of the bio-reactor housing and pumping sumps shall be of 304 series stainless steel, or of equally corrosion resistant material.
- 5.2 **Design Considerations.** CBWS shall be of sufficient strength to resist stresses caused during handling and installation, without structural cracking.
- 5.3 **Vitreous China Fixtures.** All vitreous china plumbing fixtures shall comply with ASME A112.19.2.
- 5.4 **Stainless Steel Fixtures.** All stainless steel plumbing fixtures shall comply with ASME A112.19.3 or IAPMO PS 61.
- 5.5 **Accessibility.** Access panels shall be included wherever access to user-maintained components is required.
- 5.6 **Minimum Pipe Size.** Minimum waste pipe size shall be 2 inch for urinals and 3 inch for water closets.
- 5.7 **Electrical Components.** Electrical components and controls shall complying with UL 1951. Electrical components within the splash zone shall be water-resistant or water-

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