IAPMO IGC 422-2025

PUBLIC REVIEW DRAFT

Industry Standard for

Modular Drain Waste and Vent (DWV) and Water Connection Systems

IAPMO Standard

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Preface

This is the first edition of IAPMO IGC 422, *Modular DWV and Water Connection Systems*. Volumetric modular construction has improved building efficiency through standardized, factory-built units, yet plumbing remains a major bottleneck due to traditional on-site connection methods. These post-installation processes introduce delays, safety hazards, and trade conflicts, as crews must access tight spaces and work around other trades after modules are in place. The Modular DWV and Water Connection System (MDWCS) addresses this issue by enabling full factory installation of domestic water and DWV systems. Using telescoping fittings, vertical couplings, and a proprietary alignment system, MDWCS allows fast bolted connections during module placement. This innovation eliminates the need for traditional on-site plumbing work, enhancing safety, reducing schedule delays, and lowering costs. MDWCS marks a significant advancement in modular construction by resolving a long-standing inefficiency and supporting scalable, high-throughput project delivery.

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:

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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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(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.*

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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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(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.

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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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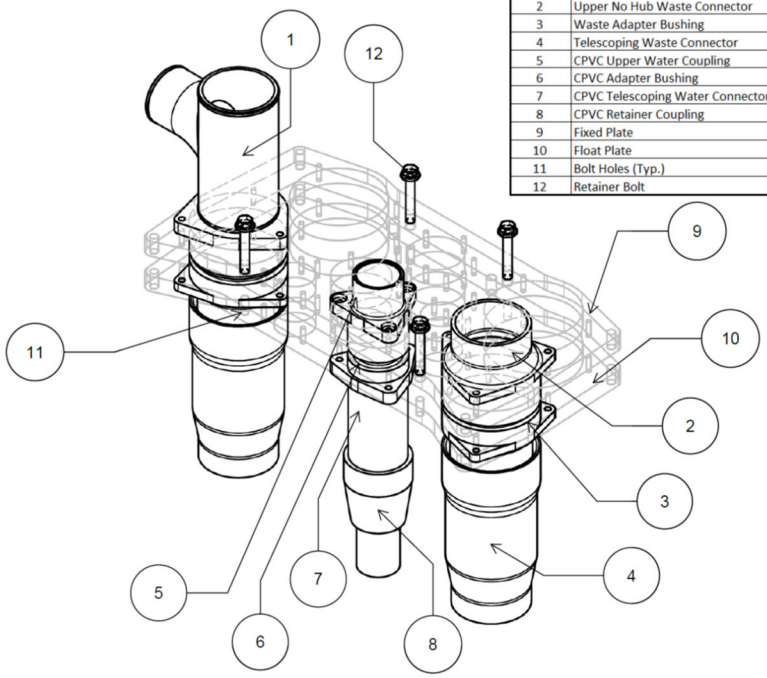
IAPMO IGC 422-2025
Modular DWV and Water Connection System

1 Scope

1.1 Scope

This Standard covers modular drain, waste and vent (DWV) and water connection systems (hereafter MDWCS) and specifies requirements for materials, physical characteristics, performance testing, and markings. MDWCS consists of the components shown in Figure 1:

Modular DWV and Water Connection System (MDWCS)



Components: Modular DWV and Water Connection System (MDWCS)	
Part Ref.	Part Description
1	Upper Waste Tee Connector
2	Upper No Hub Waste Connector
3	Waste Adapter Bushing
4	Telescoping Waste Connector
5	CPVC Upper Water Coupling
6	CPVC Adapter Bushing
7	CPVC Telescoping Water Connector
8	CPVC Retainer Coupling
9	Fixed Plate
10	Float Plate
11	Bolt Holes (Typ.)
12	Retainer Bolt

Figure 1

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.

ASME (American Society of Mechanical Engineers)
ASME B1.20.1-2013 (R2018)
Pipe Threads, General Purpose (inch)

ASME B1.20.3-1976 (R2023)
Dryseal Pipe Threads (inch)

ASTM (American Society for Testing and Materials)
ASTM D6284-17 (R2023)
Standard Test Method for Rubber Property – Effect of Aqueous Solutions with Available Chlorine and Chloramine

CSA (Canadian Standards Association)

CSA C22.2 No. 0.15:15 (R2020)
Adhesive Labels

ICC (International Code Council)
ICC-ES AC156-24
Seismic Certification by Shake-table Testing on Nonstructural Components

NSF International
NSF/ANSI/CAN 61 (2024)
Drinking Water System Components – Health Effects

NSF/ANSI/CAN 372 (2024)
Drinking Water System Components – Lead Content

Office of the Federal Register (OFR)
Code of Federal Regulations Title 21, Section 177-2016, Food and Drugs: Indirect Food Additives: Polymers

UL (Underwriters Laboratories)
Marking and Labeling Systems

3 Definitions and Abbreviations

3.1 Definitions

Bolt Holes (Typ.) – openings that allow for bolted connections to fixed and floating plates that secure gasketed connectors into place

CPVC Adapter Bushing – gasketed bushing allows for adaptation tolerance in the vertical or "Z" movement direction for water risers

CPVC Retainer Coupling – solvent weld coupling to isolate differential movement and thermal expansion between CPVC piston and CPVC pipe

CPVC Telescoping Water Connector – gasketed piston that can telescope vertically to facilitate connecting module water risers as the modules are set into position

CPVC Upper Water Coupling – gasketed connector that allows for instant "push fit" vertical water connections

Fixed MDWCS Plate – Fixed plate bolted to modular structure where all upper water and waste connectors install into the fixed pate as an assembly. The Fixed MDWCS plate bolts to Float MDWCS Plate for final install after modules are set into position. This bolting process locks in all gasketed fittings for final installation.

Float MDWCS Plate – floating plate which incorporates waste/water adapter bushings and telescoping fittings and has built in tolerance to align with fixed plate

Telescoping Waste Connector – gasketed piston that can telescope vertically to facilitate connecting modular waste and vent stacks as the modules are set into position

Upper No Hub Waste Connector – gasketed connector that allows for instant "push fit" vertical waste connections

Upper Waste Tee Connector – waste Tee either welded to or fabricated as part of the gasketed fixed connector for transitioning horizontal waste to vertical waste "push fit" connections

Waste Adapter Bushing – gasketed Bushing allows for adaptation tolerance in the vertical or "Z" movement direction for waste stacks

3.2 Abbreviations

ABS – Acrylonitrile Butadiene Styrene

AISI – American Iron and Steel Institute

AL – Aluminum

CI – Cast Iron

CPVC – Chlorinated Polyvinyl Chloride

EPDM – Ethylene Propylene Diene Mnomer

PVC – Polyvinyl Chloride

SS – Stainless Steel

4 General Requirements

4.1 General

Product shall comply with the requirements of NSF/ANSI/CAN 61 and NSF/ANSI/CAN 372.

4.2 Size Ranges

Water connections are offered in sizes DN x-y (NPS a-b). DWV connections are offered in sizes DN x-y (NPS a-b).

4.3 Maximum Operating Temperature

The maximum operating temperature shall be specified by the manufacturer.

4.4 Maximum Operating Pressure

The maximum operating pressure shall be at least 100 psig (690 kPa) or the manufacturer's rated pressure, whichever is greater.

4.5 Materials

Alloys, rubber, engineered plastics or other materials which are adaptable and will give at least equivalent trouble-free performance in service shall be allowed. In such cases, it shall be the responsibility of the manufacturer to demonstrate to an approved testing agency that the material has been successfully used in similar applications for at least 1 year.

4.5.1 Materials in Contact with Water

Solder and fluxes containing lead in excess of 0.2% shall not be used in contact with potable water.

4.5.2 Elastomers and Polymers

All elastomers and polymers in contact with the water shall comply with the requirements of the United States Code of Federal Regulations (CFR) Title 21, Section 177 or the material shall be certified as non-toxic by an independent approved laboratory. Wetted elastomers shall be certified as chlorine and chloramine resistant per ASTM D6284.

4.5.3 Ferrous Cast Parts

Ferrous cast parts shall conform to ASTM A126 for gray iron or ASTM A536 Grade 65-45-12 for ductile iron.

4.5.4 Stainless Steel Components

Stainless steel components in contact with water shall be AISI Series 300.

4.5.5 Flexible Non-Metallic Parts

Diaphragms, valve discs, seat facings or other flexible non-metallic parts shall be designed for continuous exposure to water at the extreme operating temperature ranges and maximum rated pressure of the assembly without change in physical characteristics which would prevent full compliance with all requirements of the standard.

4.6 Threads

a) Taper pipe threads, except dryseal, shall be in compliance with ANSI/ASME B1.20.1.
b) Dryseal shall be in compliance with ANSI/ASME B1.20.3. (1/4-20, for example)

4.7 Toxicity

All wetted components intended for use in potable water systems shall comply with the applicable requirements of NSF/ANSI 61 and 372.
Note: See Section 6.1 for marking requirements for products intended for use in potable water systems.

5 Testing Requirements

5.1 General

5.1.1 Test specimens shall be assembled into the test apparatus per the manufacturer's instructions.

5.2 Hydrostatic Pressure Tests

5.2.1 Hydrostatic Pressure Test at 20˚C (68˚ F)

5.2.1.1 Test Procedure for Water and DWV Connections

The hydrostatic pressure test at 20˚C (68˚ F) shall be conducted as follows:

(a) Install the MDWCS into the test apparatus per Figure 1.
(b) Fill the test specimen with water at 20 ± 3˚C (68 ± 5˚F).
(c) Remove all air from the system via the bleed valve.
(d) For water connections, pressurize the test specimen to 1379 ± 35 kPa (200 ± 5 psi) or two times the manufacturer's rated pressure, whichever is greater. For DWV connections, pressurize the test specimen to 68.9 ± 2 kPa (10 ± 0.3 psi).
(e) Maintain the pressure for ten minutes.

5.2.1.2 Test Criteria

After ten minutes, there shall be no leakage or indications or permanent deformation on any of the MDWCS's components.

5.2.2 Hydrostatic Pressure Test at 93˚C (200˚ F)

5.2.2.1 Test Procedure

The hydrostatic pressure test at 93˚C (200˚ F) shall be conducted as specified in Section 5.2.1.1, except the water temperature shall be 93 ± 3˚ (200 ± 5˚ F).

5.2.2.2 Test Criteria

After ten minutes, there shall be no leakage or indications or permanent deformation on any of the MDWCS's components.

5.2.3 Sustained Hydrostatic Test at Ambient Temperature

5.2.3.1 Test Procedure

The sustained hydrostatic pressure test at ambient temperature [23.9˚C (75.0˚F) max] shall be conducted as specified in Section 5.2.1.1, except the water temperature shall be ambient, the pressure shall be 552 ± 14 kPa (80 ± 2 psi) for water connections and 34.5 ± 2 kPa (5.0 ± 0.3 psi) for DWV connections, and the duration of the test shall be 24 hours.

5.2.3.2 Test Criteria

After 24 hours, there shall be no degradation of system pressure below 531 kPa (77 psi).

5.3 Vacuum Test

5.3.1 Test Procedure

The vacuum test shall be conducted as follows:

(a) Assemble the test specimen in accordance with Section 5.1.1.

(b) Subject the test specimen to a vacuum of 82.9 ± 1.7 kPa (12 ± 0.25 psi).

Note: 82.9 ± 1.7 kPa (12 ± 0.25 psi) is equivalent to 622 ±13 mm (24.5 ±0.5 in) of mercury.

(c) Once the vacuum is established, isolate the test specimen and monitor the vacuum for 1 h.

5.3.2 Test Criteria

The change in vacuum shall not exceed 5 kPa (0.73 psi).

Note: 5 kPa (0.73 psi) is equivalent to 38 mm (1.5 in) of mercury.

5.4 Hydraulic Shock (Water Hammer) Test for Water Connections

5.4.1 Test Procedure

The hydraulic shock (water hammer) test shall be conducted as follows:

(a) Assemble the test specimen in accordance with Section 5.1.1.

(b) Fill the test specimen with water at 20 ± 3°C (68 ± 5°F) at atmospheric pressure.

(c) Subject the test specimen to a hydraulic shock consisting of a rapid increase in pressure to 2,586 ± 207 kPa (375 ± 30 psi) lasting 0.01 ± 0.005 s.

(e) Repeat the hydraulic shock once every 2 s for 10,000 times.

5.4.2 Test Criteria

Any indication of leakage, damage or separation of the tubing from connection interfaces shall be cause for failure.

5.5 Seismic Test

5.5.1 Test Procedure

Subject the pressurized test specimen (552 ± 14 kPa (80 ± 2 psi) for water connections and 34.5 ± 2 kPa (5.0 ± 0.3 psi) for DWV connections) to acceleration in the two principal horizontal axes and the vertical axis individually (uniaxial tests) per ICC ES AC156. Test shall be conducted at ambient temperature.

5.5.2 Test Criteria

There shall be no leakage upon completion of the seismic test.

5.6 Thermal Cycling Test

5.6.1 Test Procedure

The thermal cycling test shall be conducted as follows:

(a) Mount the test specimen in a test apparatus capable of flowing water through it while pressurized.

(b) Pressurize the test specimen with flowing water to 690 ± 35 kPa (100 ± 5 psi), or the manufacturer's rated pressure, whichever is greater.

(c) Subject the MDWCS to 2500 thermal cycles by flowing water through it at

(i) 20 ± 3˚ C (68 ± 5°F) for 5 min.; and

(ii) 93 ± 3˚ C (200 ± 5°F) for 5 min.

(d) Ensure that the water temperature change fully occurs for each cycle occurs within the first 90 seconds.

5.6.2 Test Criteria

There shall be no leakage.

5.7 Elevated Flow Test

5.7.1 Test Procedure

The thermal cycling test shall be conducted as follows:

(a) Mount the test specimen in a test apparatus capable of flowing water through it while pressurized.

(b) Flow 20 ± 3°C (68 ± 5°F) water through the test specimen at a velocity of 3 ± .3 m/s (10 ± 1 ft/s) for 30 min.

5.7.2 Test Criteria

Any indication of leakage, damage or separation of the tubing from connection interfaces shall be cause for failure.

6 Markings and Accompanying Literature

6.1 Markings

Modular DWV and Water Connection Systems complying with this Standard shall be marked with the:

(a) manufacturer's name or trademark

(b) model number, if applicable

(c) maximum temperature and pressure rating

(d) IAPMO standard designation (i.e. "IAPMO IGC 422")

6.2 Visibility

Markings shall be permanent, legible, and visible after installation. Adhesive labels that comply with CSA C22.2 No. 0.15 or UL 969 shall be considered permanent.

6.3 Installation Instructions

Modular DWV and Water Connection Systems complying with this Standard shall be accompanied by instructions for their installation.

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