IAPMO IGC 304-~~2014e1~~2025

PUBLIC REVIEW DRAFT

Industry Standard for

Flexible Expansion Joints for DWV and Sewer Piping Systems

IAPMO Standard

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Flexible Expansion Joints for DWV and Sewer Piping Systems
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- *(d) the request for interpretation phrased in such a way that a "yes" or "no" answer will address the issue.*

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Flexible Expansion Joints for DWV and Sewer Piping Systems

1 Scope

1.1 This Standard covers stainless steel flexible expansion joints intended to absorb movements in drain, waste, and vent and sewer systems caused by thermal expansion and contraction and building structural movements, and specifies requirements for materials, physical characteristics, performance testing, and markings.
Note: *In this Standard, "stainless steel flexible expansion joints intended for drain, waste, and vent and sewer applications" are referred to as "flexible joints".*

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

1.4 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.

1.5 Proposals for amendments to this Standard will be processed in accordance with the standards writing procedures of IAPMO.

1.6 The user's attention is called to the possibility that compliance with this Standard might require use of an invention covered by patent rights. By publication of this Standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a

license, then details can be obtained from IAPMO.

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 BPVC-2025	Boiler and Pressure Vessel Code
ASME B16.5-2025	Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard
ASTM A312-25	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ISO ~~15465~~-2004	Pipework – Stripwound metal hoses and hose assemblies
MSS SP-6-2021	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings

3 Abbreviations

The following abbreviations apply in this Standard:
DWV — drain, waste, and vent

4 General Requirements

4.1 General

Flexible joints covered by this Standard shall
(a) comprise two sections of flexible stainless steel hoses with outer braids and liners, joined to stainless steel fittings;
(b) have floating flanges that allow for pitch adjustment; and
(c) have cleanouts that allow for adequate access for cleaning.

4.2 Flexible Hoses, Braids, and Liners

4.2.1 Materials

Flexible hoses, braids, and liners shall be made of Type 304 or Type 321 stainless steel alloy.

4.2.2 Flexible Liner Manufacture

Liners shall be manufactured in accordance with ISO 15465.

4.2.3 Flexible Hose Dimensions

~~The inside diameter of flexible hoses shall be larger than the inside diameter of the connecting~~

~~fittings.~~ The nominal flexible hose size must match or exceed the nominal pipe size of the DWV system.

4.2.4 Length of Flexible Hoses

The length of the flexible hoses shall depend on the amount of lateral movement and shall be as specified in Table 1.

4.2.5 Flexible Hose and Fitting Connections

The connections between flexible hoses and fittings shall be eccentric so that the flexible joints have flat bottoms.

4.3 Fittings

Fittings used for the manufacture of flexible joints shall be

(a) Schedule 40S;
(b) made of Type 304 stainless steel alloy; and
(c) compatible with pipe manufactured in accordance with ASTM A312.

Note: *Schedule 40S is commonly referred to as "standard weight" and the terms are equivalent for pipe NPS-12 and smaller.*

4.4 Pipe

Pipe used for the manufacture of flexible joints shall

(a) be Schedule 40S;
(b) be made of Type 304 stainless steel alloy; and
(c) comply with ASTM A312.

Note: *Schedule 40S is commonly referred to as "standard weight" and the terms are equivalent for pipe NPS-12 and smaller.*

4.5 Flanges

4.5.1 Flanges shall be floating to allow for pitch adjustments.

4.5.2 Flange stub ends shall be

(a) Schedule 40S;
(b) made of Type 304 stainless steel alloy;
(c) Type B, as specified in MSS SP-6;and
(d) compatible with pipe manufactured in accordance with ASTM A312.

Note: *Schedule 40S is commonly referred to as "standard weight" and the terms are equivalent for pipe NPS-12 and smaller.*

4.5.3 Flange backing rings shall

(a) be made of Type 304 stainless steel alloy; and
(b) comply with the requirements for 68 kg (150 lb) drilled-plate flanges specified in ASME B16.5.

4.6 Hubless Connections

Connections with hubless fittings shall be achieved with 150 mm (6 in) long stainless steel pipe that complies with Section 4.5.

4.7 Welding

Welding shall be performed in accordance with Section IX, Qualification standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operations, of the ASME Boiler and Pressure Vessel Code (BPVC).

5 Testing Requirements

5.1 Cycling Test

The cycling test shall be conducted by subjecting the test specimen to 100 cycles from one extreme of the expansion range to the other at a test ambient temperature of 21 ± 2 ºC (70 ± 4ºF). The cross head speed shall be approximately 500 mm/min (20 in/min).

5.2 Hydrostatic Pressure Test

5.2.1 Test Procedure

The hydrostatic pressure test shall be conducted following completion of the cycling test specified in Section 5.1 as follows:

(a) Seal the test specimen and fill it with water to the level of overflow.
(b) Extend the flexible joint to approximately the middle of its full expansion length.
(c) Subject the test specimen to hydrostatic pressure of 1,035 kPa (150 psi).
(d) Maintain the pressure for at least 15 min.

5.2.2 Performance Requirement

There shall be no leakage.

5.3 Air Test

5.3.1 Test Procedure

The air test shall be conducted as follows:

(a) Submerge test specimen in water.
(b) Pressurize the test specimen to 34.5 kPa (5 psi) using an air compressor.
(c) Maintain the pressure, without introduction of additional air, for at least 15 min.

5.3.2 Performance Requirement

There shall be no leakage of air.

6 Markings and Accompanying Literature

6.1 Flexible joints 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 304”);
(d) intended service (e.g., DWV or sewer);
(e) maximum working pressure; and
(f) maximum working temperature.

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

6.3 Flexible joints shall be accompanied by instructions for their installation, specifying at least the requirements for hanging and supporting.

Table 1
Length of Flexible Hoses Depending on the Anticipated Lateral Movement

(See Section 4.2.4)

Note: These values indicate the length of flexible hose to account for the full rated lateral movement. Joints that are rated for any amount of lateral movement may contain two sections, each accounting for half of such movement.

Nominal Pipe Size	Lateral Movement per Hose, mm (in)									
	25 (1)		50 (2)		75 (3)		100 (4)		125 (5)	
	Length of Flexible Hose, mm (in)									
2	280.4	(11.0)	382.5	(15.1)	462.3	(18.2)	530.6	(20.9)	591.6	(23.3)
2-1/2	330.2	(13.0)	447.5	(17.6)	538.7	(21.2)	616.5	(24.3)	685.8	(27.0)
3	343.7	(13.5)	466.6	(18.4)	561.8	(22.1)	643.1	(25.3)	715.5	(28.2)
4	375.2	(14.8)	510.8	(20.1)	616.0	(24.3)	705.4	(27.8)	784.9	(30.9)
6	424.9	(16.7)	581.2	(22.9)	701.8	(27.6)	804.2	(31.7)	895.1	(35.2)
8	445.0	(17.5)	609.6	(24.0)	736.6	(29.0)	844.3	(33.2)	939.8	(37.0)
10	491.5	(19.4)	675.1	(26.6)	816.6	(32.2)	936.5	(36.9)	1,042.7	(41.1)
12	533.4	(21.0)	734.3	(28.9)	889.0	(35.0)	1,020.1	(40.2)	1,135.9	(44.7)
14	572.0	(22.5)	788.7	(31.1)	955.5	(37.6)	1,096.8	(43.2)	1,221.7	(48.1)
16	586.7	(23.1)	809.5	(31.9)	980.9	(38.6)	1,126.0	(44.3)	1,254.3	(49.4)
18	614.7	(24.2)	849.1	(33.4)	1,029.7	(40.5)	1,182.1	(46.5)	1,317.0	(51.9)
20	641.6	(25.3)	887.0	(34.9)	1,075.9	(42.4)	1,235.7	(48.7)	1,376.7	(54.2)

Nominal Pipe Size	Lateral Movement per Hose, mm (in)							
	150 (6)		200 (8)		250 (10)		300 (12)	
	Length of Flexible Hose, mm (in)							
2	647.7	(25.5)	749.3	(29.5)	841.2	(33.1)	926.8	(36.5)
2-1/2	749.3	(29.5)	863.6	(34.0)	966.7	(38.1)	1,061.7	(41.8)
3	781.6	(30.8)	900.9	(35.5)	1,007.9	(39.7)	1,106.7	(43.6)
4	857.3	(33.8)	987.6	(38.9)	1,104.1	(43.5)	1,211.3	(47.7)
6	977.9	(38.5)	1,126.0	(44.3)	1,258.3	(49.5)	1,379.5	(54.3)
8	1,026.7	(40.4)	1,182.1	(46.5)	1,320.8	(52.0)	1,447.5	(57.0)
10	1,139.2	(44.9)	1,311.7	(51.6)	1,465.1	(57.7)	1,605.0	(63.2)
12	1,241.0	(48.9)	1,429.0	(56.3)	1,595.9	(62.8)	1,747.8	(68.8)
14	1,335.0	(52.6)	1,537.0	(60.5)	1,716.3	(67.6)	1,879.6	(74.0)
16	1,370.6	(54.0)	1,578.1	(62.1)	1,762.3	(69.4)	1,929.6	(76.0)
18	1,439.2	(56.7)	1,657.4	(65.3)	1,850.4	(72.9)	2,026.2	(79.8)
20	1,504.7	(59.2)	1,732.5	(68.2)	1,934.5	(76.2)	2,118.1	(83.4)

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