ASTM INTERNATIONAL

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Standard Safety Performance Specification for Safe Design and Installation of Field Fabricated Suction-Limiting Vent Systems for Suction Entrapment Prevention in Swimming Pools, Spas, Hot Tubs, and Wading Pools[1]

This standard is issued under the fixed designation F2707; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

ε¹ NOTE—Editorially corrected Referenced Documents in June 2018.

1. Scope

1.1 This safety performance specification provides requirements for safety in design and installation when using a suction-limiting vent system for suction entrapment prevention in swimming pools, spas, hot tubs, or wading pools.

1.2 The purpose of the vent is to relieve the vacuum at the suction outlet(s) caused by any blockage of the suction outlet(s). The vent is intended to prevent body entrapment at the suction outlet(s) and may also mitigate limb entrapment. It is not intended to prevent other injuries caused by the suction outlet(s) such as hair entrapment, mechanical entrapment, or evisceration.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ANSI Standards:*[2]
ANSI Z535.2 Environmental and facility safety signs
ANSI Z535.4 Product safety signs and labels
ANSI/APSP 16 Standard Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs

3. Terminology

3.1 *Definitions:*

3.1.1 *allowable drawdown, n*—drawdown depth corresponding to the acceptable removal effort for a particular uncovered sump; it is physically built into the system.

3.1.2 *engineer, n*—registered professional engineer.

3.1.3 *field-fabricated vent (FFV), n*—open-to-atmosphere vent installed between the pool suction outlet(s) and the suction side of the pump in such a way as to relieve the vacuum caused by a blockage of the suction outlet(s).

3.1.4 *operating drawdown, n*—lowering of the water level in the vent from the static condition caused by normal operation.

3.1.5 *purge test, n*—placing a blocking element over the sump to ensure that air enters the vent system.

3.1.6 *startup surge, n*—transient lowering of the water level in the vent during pump startup.

3.1.6.1 *Discussion*—If excessive, the pump may lose prime.

4. Significance and Use

4.1 This performance specification outlines the requirements needed to design and install a field-fabricated vent for safety purposes. Vents only address suction outlet body and may mitigate limb entrapment. Vents have proven effective

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when installed correctly. It is not intended to prevent other injuries caused by suction outlet(s) such as hair entrapment, mechanical entrapment, or evisceration.

5. General Requirements

5.1 Design and installation instructions for field-fabricated vents (FFV) shall be certified only by a registered professional engineer. Multiple systems may be built to the same "vent design drawings and specifications" with the approval of the engineer.

5.2 The design and installation of the vent is specific to each piping system and shall consider all relevant parameters including but not limited to: elevations, flow rate, startup surge, minimum and maximum water operating levels, water depth at the suction outlet(s), pipe fittings, spacing between fittings, atmospheric vent fitting, and suction outlet configurations.

5.3 The vent shall be tested in place for proper function. See Section 7 for details.

6. Specific Requirements

6.1 The engineer shall specify minimum and maximum flow rates, pipe sizes, and minimum and maximum pipe length(s), including equivalent length of fittings, elevation of critical fittings with respect to normal pool operating level, as well as the make and model of the suction outlet approved cover in accordance with ANSI/APSP 16, including the head loss at the suction fitting and the make and model of the atmospheric vent termination fitting. Vent termination fittings are rated by the size of the pipe they can successfully vent. For larger pipes, the number of fittings shall equal or exceed the flow area of the large pipe divided by the flow area of the fitting's rated pipe size.

6.2 The vent shall be designed to insure that with any or all suction outlet(s) completely blocked, the sump or vent draw-down shall not exceed the values in Table 1 for the size of a given suction outlet sump with the vent termination fitting in place and with or without the cover in place.

6.3 The vent system and atmospheric vent termination fitting shall be designed so that neither can be disabled without the use of tools.

6.4 Under normal operation, the vent system shall not adversely affect pump suction, system flow, or other equipment performance.

6.5 No check valves or valves shall be installed between any suction outlet and the atmospheric opening of the system.

6.6 The vent shall be piped to a location specified by the registered professional engineer. If the vent is located outside the deck area, the vent shall be clearly visible and above grade as indicated by the engineer.

TABLE 1 Allowable Drawdown for Circular and Square Open Sump

KcircLT9=		KcircGT9=		KsqLT9=		KsqGT9=	
Diam (in.)	Drawdown (in.)	Diam (in.)	Drawdown (in.)	Side (in.)	Drawdown (in.)	Side (in.)	Drawdown (in.)
2	132.4	9	6.5	2	104.0	9	5.1
2.25	104.6	9.25	6.7	2.25	82.1	9.25	5.3
2.5	84.7	9.5	7.0	2.5	66.5	9.5	5.5
2.75	70.0	9.75	7.1	2.75	55.0	9.75	5.6
3	58.8	10	7.4	3	46.2	10	5.8
3.25	50.1	10.25	7.4	3.25	39.4	10.25	5.8
3.5	43.2	10.5	7.7	3.5	33.9	10.5	6.0
3.75	37.6	10.75	7.8	3.75	29.6	10.75	6.1
4	33.1	11	7.9	4	26.0	11	6.2
4.25	29.3	11.25	8.2	4.25	23.0	11.25	6.4
4.5	26.1	11.5	8.3	4.5	20.5	11.5	6.5
4.75	23.5	11.75	8.5	4.75	18.4	11.75	6.7
5	21.2	12	8.8	5	16.6	12	6.9
5.25	19.2	12.25	8.9	5.25	15.1	12.25	7.0
5.5	17.5	12.5	9.0	5.5	13.7	12.5	7.1
5.75	16.0	12.75	9.3	5.75	12.6	12.75	7.3
6	14.7	13	9.4	6	11.6	13	7.4
6.25	13.6	13.25	9.8	6.25	10.6	13.25	7.6
6.5	12.5	13.5	9.9	6.5	9.8	13.5	7.8
6.75	11.8	13.75	10.0	6.75	9.1	13.75	7.8
7	10.8	14	10.1	7	8.5	14	7.9
7.25	10.1	14.25	10.3	7.25	7.9	14.25	8.1
7.5	9.4	14.5	10.6	7.5	7.4	14.5	8.3
7.75	8.8	14.75	10.7	7.75	6.9	14.75	8.4
8	8.3	15	10.8	8	6.5	15	8.5
8.25	7.8	15.25	11.1	8.25	6.1	15.25	8.7
8.5	7.3	15.5	11.3	8.5	5.8	15.5	8.9
8.75	6.9	15.75	11.4	8.75	5.4	15.75	9.0
9	6.5	16	11.6	9	5.1	16	9.1
		16.25	11.8			16.25	9.3
		16.5	11.9			16.5	9.4
		16.75	12.2			16.75	9.6
		17	12.3			17	9.7
		17.25	12.5			17.25	9.8
		17.5	12.7			17.5	10.0
		17.75	12.9			17.75	10.1
		18	13.1			18	10.3