

2006 INTERNATIONAL RESIDENTIAL CODE

Code Change No: **RB227-07/08**

Original Proposal

Sections: AG 106.1, AG106.2, AG106.3, AG106.4, AG106.4.1, AG106.4.2, AG106.4.3, AG106.4.4, AG106.4.5, AG106.5, AG106.6, AG 108; IBC 3109.5, 3109.5.1, 3109.5.2, 3109.5.3, 3109.5.4, Chapter 35

Proponent: Lorraine Ross, Intech Consulting, Inc., representing the Association of Pool and Spa Professionals

THESE PROPOSALS ARE ON THE AGENDA OF THE IRC BUILDING/ENERGY AND THE IBC GENERAL CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IRC

1. Delete and substitute as follows:

~~**AG106.1 General.** Suction outlets shall be designed to produce circulation throughout the pool or spa. Single outlet systems, such as automatic vacuum cleaner systems, or multiple suction outlets, whether isolated by valves or otherwise, shall be protected against user entrapment.~~

AG106.1 Suction entrapment avoidance. Pools, spas, hot tubs, catch basins and other similar bather accessible bodies of water associated with swimming pool construction shall be designed to produce circulation throughout the body of water and provide means to protect against user suction entrapment in accordance with ANSI/APSP 7.

2. Delete without substitution:

~~**AG106.2 Suction fittings.** Pool and spa suction outlets shall have a cover that conforms to ANSI/ASME A112.19.8M, or an 18 inch×23 inch (457mmby 584 mm) drain grate or larger, or an approved channel drain system.~~

~~**Exception:** Surface skimmers~~

~~**AG106.3 Atmospheric vacuum relief system required.** Pool and spa single or multiple-outlet circulation systems shall be equipped with atmospheric vacuum relief should grate covers located therein become missing or broken. This vacuum relief system shall include at least one approved or engineered method of the type specified herein, as follows:~~

- ~~1. Safety vacuum release system conforming to ASME A112.19.17; or~~
- ~~2. An approved gravity drainage system.~~

~~**AG106.4 Dual drain separation.** Single or multiple pump circulation systems shall be provided with a minimum of two suction outlets of the approved type. A minimum horizontal or vertical distance of 3 feet (914 mm) shall separate the outlets. These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum-relief-protected line to the pump or pumps.~~

~~**AG106.5 Pool cleaner fittings.** Where provided, vacuum or pressure cleaner fitting(s) shall be located in an accessible position(s) at least 6 inches (152 mm) and not more than 12 inches (305 mm) below the minimum operational water level or as an attachment to the skimmer(s).~~

3. Add standard in Section AG108 as follows:

ANSI/APSP-7-06 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins

CODE CHANGES RESOURCE COLLECTION – INTERNATIONAL BUILDING CODE

Reason: This proposal adds a new standard, ANSI/APSP 7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins into IRC Section AG 106. It also deletes Sections AG 106.2 through AG 106.6 because all of these requirements have been incorporated into ANSI/APSP 7.

The current code language was an early response to body entrapment only. New information and technology has contributed to this new ANSI/APSP consensus standard and addresses all forms of entrapment, including the underlying causes of entrapment.

Although rare, entrapment of bathers at suction outlets in pools and spas has gained considerable attention over the last decade, resulting in voluntary standards, building codes, and proposed national legislation to prevent these tragic accidents.

A survey of the Epidemiological Reports on Suction Entrapment collected by the U.S. Consumer Product Safety Commission by the Association of Pool and Spa Professionals (APSP) Technical Committee yielded 5 distinct modes of Entrapment:

Entrapment Type	Percentage of Incidents
Hair Entrapment - Hair becomes knotted or snagged in an outlet cover	33%
Limb Entrapment – A limb sucked or inserted into an opening of a circulation outlet with a broken or missing cover resulting in a mechanical bind or swelling	28%
Body Entrapment – Suction applied to a large portion of the body or limbs resulting in an entrapment	33%
Evisceration/Disembowelment – suction applied directly to the intestines by a circulation outlet with a broken or missing cover.	3%
Mechanical Entrapment - Potential for jewelry, swimsuit, hair decorations, finger, toe, or knuckle to be mechanically caught in an opening of a suction outlet or cover.	Included in limb

Early actions to address entrapment were aimed at *body* entrapment by attempting to control the suction pressure at the drain itself.

Unfortunately, these devices do not protect against the major forms of entrapment: hair or evisceration. **Additionally, if the pool circulation pump is off - meaning no suction at the outlet - a child can still get a limb trapped if there is a broken or missing cover.**

Suction is only one factor to control in entrapment avoidance.

In order to address avoidance of all forms of entrapment, a comprehensive study of the causes of all types of entrapment was undertaken. It is now known that there are three basic underlying physical phenomena that govern all 5 modes of entrapment:

- Suction (or delta pressure)
- Water flow rate through the outlet or cover
- Mechanical binding

The Technical Committee of the Association of Pool and Spa Professionals (APSP) examined various means to prevent these types of entrapments recognizing the diverse nature of pool construction. Using this knowledge, a new national consensus standard was developed in accordance with the American National Standards Institute (ANSI) process. ANSI/APSP 7 *Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot tubs, and Catch Basins (ANSI/APSP 7)* is based upon sound engineering principles, research, and field experience, that, when applied properly, provides the most comprehensive approach to protect bathers against all modes of entrapment. The ANSI standard approval process itself ensured that a wide variety of stakeholders were involved in the development of this standard, including building code officials, governmental health and pool industry experts.

The ANSI/APSP 7 standard applies to both commercial and residential pools, for flow rates from a few gallons per minute to thousands of gallons per minute. Although it includes the use of devices or systems that prevent suction, it also expands the lists of options for the pool contractor, while maintaining necessary protective principles.

ANSI/APSP-7 contains design performance criteria including components, devices and related technology installed to protect against entrapment. Analysis of past entrapments along with extensive testing shows:

- An outlet cover that complies with ASME/ANSI A112.19.8 will protect against limb, evisceration and mechanical entrapment

If the cover is missing or broken, there is no single device or system that can protect against entrapment. **For example, if the pool circulation pump is off - meaning no suction at the outlet - a child can still get a limb mechanically trapped,**

Therefore, ANSI/APSP 7 contains a warning to shut down the pool.

Unlike suction release devices that must be tested monthly, a pool owner can easily see if the cover is broken or missing. Having a SVRS with a missing or broken cover does not protect against limb, hair or mechanical entrapment and may give a pool owner a false sense of security regarding entrapment prevention.

- The maximum water flow rate in ANSI/APSP-7 is based on 6 fps and when combined with the required outlet cover provides protection against hair, limb, evisceration and mechanical entrapment.

Testing shows that water flow has a significant impact on entrapment avoidance.

- When used with a proper outlet cover and maximum water flow rate, options to address body entrapment in ANSI/APSP-7 include:
 - Dual Outlets at least 36" apart, measured center to center
 - Three or more outlets
 - Single Unblockable
 - Swim Jet
 - Alternative Suction System
 - Gravity Flow Systems
 - Outlet pumps in Series plus
 - SVRS, or
 - Vent, or
 - Additional Suction

The ability of dual drains to prevent body entrapment was recently demonstrated by a series of tests conducted by the APSP Technical Committee. Results showed that even with one drain blocked and a missing cover on the other, the low water flow rate mandated by ANSI/APSP-7 prevented the necessary suction to hold down the 15 lb buoyant block used as a "pass" criteria when testing SVRS.

This test series illustrates the importance of water flow at the outlet when developing entrapment avoidance measures.

ANSI/APSP-7 utilizes the most comprehensive approach to outlet entrapment because it considers all underlying causes: suction, water flow and mechanical – while recognizing the diverse nature of pool and spa design. It covers all 5 forms of entrapment.

Tests conducted on dual outlets configured as described in ANSI/APSP-7 demonstrate:

- The size of the outlets and piping do have an effect on safe installation
- Water velocity of 6 fps (ANSI/APSP-7 maximum) *passed* an analogous ASME/ASTM SVRS test protocol,
- The combination of maximum water flow rates and dual outlets prevent body entrapment (with no SVRS), even if one outlet is blocked.
- Dual outlets, when installed according to ANSI/APSP-7, pass the same test criteria as the SVRS in both ASME/ANSI A112.19.17-2002 and ASTM F2387-2003, reacting faster than the 3 seconds response time and work properly in combination with skimmers.

Using submerged piping as is found in pools and spas, tests conducted on SVRS systems and both the ASME/ASTM SVRS standards demonstrate:

- Not all SVRS tested to the ASME/ASTM SVRS Standards will reliably "trip" when combined with dual outlets and/or skimmers – Those that fail seem to interpret residual flow from the second outlet as a priming pump.
- Not all SVRS tested to the ASME/SVRS Standards "trip" with partial outlet blockage.
- Water dynamics, in particular water hammer can facilitate release. Once the block is forced off the cover by these spikes in pressure, it floats to the surface. Neutrally buoyant blocks have been documented to "hammer" on and off open pipes for several seconds.
- Water dynamics continue for several seconds. The longest on an SVRS test lasted 2.72 seconds, which may call into question the 3 second limit.

Tests conducted on a U-Tube Vent on a single 18 x 18 suction outlet demonstrates:

- A single 18 x 18 drain grate can be successfully vented operating at 420 gpm with a 1 inch PVC vent pipe.
- Release is very fast – shortest release was 2.5 seconds
- While it was difficult to completely block the drain using a Human test subject, it was possible to do so sufficiently to trip the vent. The actual suction sensation of this experience was far less than what is experienced when an 8 inch sump is blocked.

ANSI/APSP -7 is the appropriate national consensus standard that is recommended for adoption in building codes. It has taken into account the initial steps taken in the building codes for specific devices and has expanded entrapment protection to include all 5 forms of entrapment by controlling all 3 underlying entrapment causes. In short, pool and spas designed and installed in accordance with ANSI/APSP – 7 are safer than those that rely upon a single device alone.

The technical committee of APSP is committed to continuing the effort to seek new understanding and knowledge regarding entrapment avoidance. Education of building code officials, legislators, pool designers and contractors and pool owners will always be a major activity of the APSP.

Cost Impact: The code change proposal will not increase the cost of construction.

PART II – IBC GENERAL

1. Delete and substitute as follows:

~~**3109.5 Entrapment avoidance.** Suction outlets shall be designed to produce circulation throughout the pool or spa. Single outlet systems, such as automatic vacuum cleaner systems, or other such multiple suction outlets whether isolated by valves or otherwise shall be protected against user entrapment.~~

3109.5 Suction entrapment avoidance. Pools, spas, hot tubs, catch basins and other similar bather accessible bodies of water associated with swimming pool construction shall be designed to produce circulation throughout the body of water and provide means to protect against user suction entrapment in accordance with ANSI/APSP 7.

2. Delete without substitution:

~~**3109.5.1 Suction fittings.** All pool and spa suction outlets shall be provided with a cover that conforms to ASME A112.19.8M, a 12-inch by 12-inch (305 mm by 305 mm) drain grate or larger, or an approved channel drain system.~~

~~**Exception:** Surface skimmers.~~

~~**3109.5.2 Atmospheric vacuum relief system required.** All pool and spa single or multiple outlet circulation systems shall be equipped with an atmospheric vacuum relief approved or engineered method of the type specified herein, as follows:~~

- ~~1. Safety vacuum release systems conforming to ASME A112.19.17; or~~
- ~~2. Approved gravity drainage system.~~

~~**3109.5.3 Dual drain separation.** Single or multiple pump circulation systems shall be provided with a minimum of two suction outlets of the approved type. A minimum horizontal or vertical distance of 3 feet (914 mm) shall separate such outlets. These suction outlets shall be piped so that water is drawn through them simultaneously through a vacuum-relief-protected line to the pump or pumps.~~

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3. Add standard to Chapter 35 as follows:

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Reason: This proposal adds a new standard, ANSI/APSP 7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins into IBC Section 3109.5. It also deletes Sections 3109.5.1 through 3109.5.5 because all of these requirements have been incorporated into ANSI/APSP 7.

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ANSI/APSP -7 is the appropriate national consensus standard that is recommended for adoption in building codes. It has taken into account the initial steps taken in the building codes for specific devices and has expanded entrapment protection to include all 5 forms of entrapment by controlling all 3 underlying entrapment causes. In short, pool and spas designed and installed in accordance with ANSI/APSP – 7 are safer than those that rely upon a single device alone.

The technical committee of APSP is committed to continuing the effort to seek new understanding and knowledge regarding entrapment avoidance. Education of building code officials, legislators, pool designers and contractors and pool owners will always be a major activity of the APSP.

Cost Impact: This code change proposal will not increase the cost of construction

Public Hearing Results

PART I – IRC

Committee Action:

Disapproved

Committee Reason: This is a critical safety issue. The organizations need to work together to bring back a proposal that gives us better guidance. Section AG106.1 is poorly written. It is not known what is meant by "similar bather accessible bodies of water associated with swimming pools construction". Section AG106.1 is not the language directly out of the standard. This could be interpreted to apply to a drainage pond or goldfish pond in the yard. Also, this section will require all pools to have a circulation system and there are some pools that do not require this.

Assembly Action:

None

PART II – IBC GENERAL

Committee Action:

Disapproved

Committee Reason: Based upon proponents request.

Assembly Action:

None

Public Comments

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted for Part I.

Public Comment 2:

Lorraine Ross, Intech Consulting Inc., representing the Association of Pool and Spa Professionals, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

~~AG106.1 Suction entrapment avoidance. Pools, spas, hot tubs, catch basins and other similar bather accessible bodies of water associated with swimming pool construction shall be designed to produce circulation throughout the body of water and provide means to protect against user suction entrapment in accordance with ANSI/APSP-7.~~ **General.** Suction outlets shall be designed and installed in accordance with ANSI/APSP-7.

Revise standard in AG108 as follows:

ASME/ANSI

A112.19.8M-1987(R1996) 8-2007 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathing Appliances

Commenter's Reason: Current 2006 IRC entrapment avoidance language is in direct conflict with The Virginia Graeme Baker Federal Pool and Spa Safety Act, (Act) adopted in December 2007. The Act preempts sections of the IRC, and any code or state law that adopts the 2006 IRC after December 20, 2008 will be in violation of this Act. APSP realizes that this code development cycle will result in the 2009 IBC. So we are working diligently in those states where 2006 adoption has taken place or are contemplating adoption of the 2006 IBC to make necessary amendments to the entrapment avoidance section of the code.

APSP proposes this Public Comment for RB-227 Part I (IRC) to follow the intent of the Federal Act in its findings to increase pool safety by recognizing that there have been great strides in technology and pool and spa design regarding entrapment avoidance.

With respect to entrapment avoidance, the provisions in the new law are consistent with ANSI/APSP-7 American National Standard for Suction Entrapment Avoidance (ANSI/APSP-7). This standard provides that all swimming pools and spas are to use proper anti-entrapment drain covers and circulation and drainage systems. The new standard will eliminate all future risk of all five forms of entrapment in pools and spas designed and installed in accordance with ANSI/APSP-7.

Some of the areas of conflict between the 2006 IRC and the Federal Act:

- As of December 20, 2008, Section 1404 (b) of the Federal Pool and Spa Safety Act expressly prohibits the manufacture sale or introduction into commerce of any drain cover that does not comply with ASME/ANSI A112.19.8 2007. This provision is defined as a "Consumer Product Safety Rule," meaning that the issue has been pre-empted. Hence, under the Consumer Product Safety Act, state and local governments may not establish or continue in effect any standard or regulation designed to deal with this same risk of injury unless said state or local requirements are identical the federal standard. 15 U.S.C. 2075(a).
- The 2006 IRC Section AG108 currently refers to the prior and now superseded 1987 (reaffirmed 1996) edition of the ASME A112.19.8 standard. This modification, which adopts the 2007 version of the standard corrects this conflict between the 2006 IBC and the Federal Act. There are substantial differences between this earlier edition and the 2007 version which is cited in the Act. For example, the newer standard includes enhanced resistance to UV rays, enhanced fastening requirements, resistance to hair entanglement and a new body block test that requires each drain to prevent body entrapment even when installed as a single, blockable drain.
- Section AG 106.2 of the IRC requires ASME 19.8 complaint covers, **or** a grate 12 x 12 **or** larger **or** a channel drain. Section 1404(c)(1) of the Act requires that all outlets/drains in all public pools be protected with ASME A112.19.8 - 2007 covers, regardless of size or shape. .
- Section 1406 of the Act calls for states to allow residential pools that have
 - (I) more than one drain
 - (II) 1 or more unblockable drains, or
 - (III) no main drain)

Section AG106.1 of the IRC states "Suction outlets shall be designed to produce circulation throughout the pool or spa," and code officials have at times interpreted this provision to mean that a pool or spa may not be built without a main drain. This is in direct conflict with the intent of Congress, which is to allow states to permit pools without drains. Elimination of drains is the most effective way to eliminate entrapment injuries.

ANSI/APSP-7 (section 5.2) expressly allows for pools without suction outlets.

- 1406(d)(1) of the Act calls for states to require one of a series of options on residential pools "except for pools constructed without a single main drain." This is consistent with ANSI/APSP-7, which recognizes that SVRS and other shut off devices are only intended to work and are tested to work on pools or spas that have a single source of suction, not pools or spas with multiple drains. The Act also allows for eight backup options including any device which complies with either SVRS standard ASME or ASTM. However, the 2006 IRC section excludes five of these options, ignores one of the recognized SVRS standards cited in the Act and also requires "a backup for another backup" when multiple outlets are present –a clear conflict with the Federal Act. This IRC provision is also not consistent with the Act.

COMPARISON OF FEDERAL POOL AND SPA SAFETY ACT 2007*, ANSI/APSP-7 AND 2006 IRC CODE

Federal Pool & Spa Safety Act of 2007 *	ANSI/APSP-7 (See Note 1)	2006 ICC International Residential Codes
1404 (b) FEDERAL ACT (See Note 2) Requires that all drain (suction outlet) covers be tested and certified to ASME/ANSI A112.19.8-2007	Yes Section 4.5	No Section AG106.2 Exempts drains 18" x 23" or larger Exempts channel drains Permits grates 18" x 23" or larger
1406(a)(1)(A)(iv) <u>GRANT PROGRAM</u> Requires such covers to comply with "any successor standard" or version of ASME/ANSI A112.19.8	Yes Section 4.5	No Section AG108 Standards lists ANSI/ASME A112.19.8M-1987 (R1996) Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs and Whirlpool Bathing Appliances
1406(d)(1)(A-F) <u>GRANT PROGRAM</u> Existing pools with single drain that is not unblockable to have added protection	Yes Section 6.3	Yes Section AG106.3
1406(d)(1)(A-F) <u>GRANT PROGRAM</u> Allows all options recognized in ASME/ANSI A112.19.17 to protect single drain installations in residential pools and spas	Yes Section 7	No Section AG106.3 Prescriptive language requires "atmospheric vacuum relief" eliminating reversing circulation flow inconsistent with ASME/ANSI A112.19.17 Section 1.4 <i>Safety Vacuum Release System</i>
1406(d)(1)(A-F) <u>GRANT PROGRAM</u> Allows all devices that comply with ASTM F2387 to protect single drain installations in residential pools and spas	Yes Section 7.1	No Section AG106.3 Sub 1. Section AG108 Standards: ASTM F2387 not included
1406(d)(1)(A-F) <u>GRANT PROGRAM</u> Recognizes that SVRS or other devices are not required on pools or spas with multiple drains or an unblockable drain in residential pools	Yes Section 5.5.2	No Section AG3109.5.2

1. ANSI/APSP-7 2006 Standard for Suction Entrapment Avoidance in Swimming Pools, wading Pools, Spas, hot Tubs and Catch Basins.

2. Federal Act refers to section 1404, which creates a Federal Swimming Pool and Spa Drain Cover Standard, and requires that public pools be equipped with certain devices.

* The Federal Pool and Spa safety Act also known as the Virginia Graeme Baker Pool & Spa Safety Act

Adopting ANSI/APSP-7 into the IRC easily satisfies the Federal Act mandates and requirements for the optional grant program for states in regulating residential pools and spas.

ANSI/APSP-7 was reviewed and found to be in compliance with ICC policy regarding consensus standards by the ICC Staff prior to the Code Development Hearings in Palm Springs. The Committee recommended that APSP re-examine the "charging language" regarding the reference to ANSI/APSP-7. This has been accomplished in this modification.

APSP also realizes that this code development cycle will result in the 2009 IRC. So we are working diligently in those states where 2006 adoption has taken place or are contemplating adoption of the 2006 IBC to make necessary amendments to the entrapment avoidance section of the code.

Bibliography:

Title XIV Federal Pool and Spa Safety Act: Posted by the Consumer Product Safety Commission: <http://www.cpsc.gov/pssa.pdf>

"Entrapment Prevention in Pools and Spas" by Shajee Siddiqui, Published in the January-February 2008 issue of *Building Safety Journal*, copyright International Code Council, and is reprinted with permission:

http://www.apsp.org/clientresources/documents/Siddiqui_EntrapmentPools.Spas_reprint.pdf

This item is on the agenda for individual consideration because public comments were submitted for Part II.

Public Comment 2:

Lorraine Ross, Intech Consulting Inc., representing the Association of Pool and Spa Professionals, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

~~**3109.5 Suction entrapment avoidance.** Pools, spas, hot tubs, catch basins and other similar bather accessible bodies of water associated with swimming pool construction shall be designed to produce circulation throughout the body of water and provide means to protect against user suction entrapment in accordance with ANSI/APSP-7.~~

3109.5 Entrapment avoidance. Suction outlets shall be designed and installed in accordance with ANSI/APSP-7.

Commenter's Reason: Same reason as Part I.

Final Hearing Results

RB227-07/08, Part I	AMPC2
RB227-07/08, Part II	AMPC2
