WARNING! Suction Entrapment Hazard

Outside the scope of this Standard. Consult a Licensed Professional Engineer.

Are Outlets 24" X 24" or Larger?

Are all Outlets Listed to ASME/ANSI A112.19.8?

Does each Outlet have a Cover with a Flow Rating Equal to, or Greater than the Maximum System GPM?

NOTICE: See Section 4.6

Replace with Cover(s) Listed by a Nationally Recognized Testing Laboratory in accordance with ASME/ANSI A112.19.8

Each Replacement Cover must have a Flow Rating Equal to or Greater than the Maximum System GPM (See Section 4.6), or The Maximum System GPM may be Permanently Reduced below the Cover Flow Rating by replacing pump or permanently restricting the pump discharge flow, provided the maximum turnover time is not exceeded.

Replace with Cover(s) and/or create compliant sump.

WARNING! Suction Entrapment Hazard

Choice at Least One Option

Install additional ASME/ANSI A112.19.8 Outlet with the center to center distance between the suction pipes at least 36-inches, or on a separate plane. See Sections 4.5 & 4.6.

Convert Suction Outlet to Return Inlet by Changing the piping, provided the system piping and skimmer(s) shall be capable of handling the full system flow.

WARNING! Suction Entrapment Hazard

Is the Single Outlet:
A) An Equalizer Line piped through the second port of a skimmer?
B) a Venturi Debris Removal System,
C) a Channel Outlet at Least 3" Wide by 31" Long?

Is the center to center distance between the suction pipes at Least 36-inches, or are the Outlets on Separate Planes?

Is there a dedicated Vacuum Cleaner Fitting?

Is a Fitting Lid (cover) Tested & Listed by a Nationally Recognized Testing Laboratory in accordance with IAPMO - SPS 4?

Install or Replace with Fitting Lid Tested to: IAPMO - SPS 4

Is there a Fitting Lid (cover) Tested & Listed by a Nationally Recognized Testing Laboratory in accordance with IAPMO - SPS 4?

Any Flat & Flush Mount Covers Smaller than 12" X 12"?

Are the center to center distance between the suction pipes at Least 36-inches, or on a separate plane. See Sections 4.5 & 4.6.

Engineered Vent Systems in accordance with Section 7.2

Manufactured Safety Vacuum Release System (SVRS) Tested & Listed for the purpose by a Nationally Recognized Testing Laboratory in accordance with Section 7.1.

Permanently Disable the Single Outlet, provided the system piping and skimmer(s) shall be capable of handling the full system flow and minimum turnover rates are achieved.

Is the Cover(s) mounted on a manufactured Sump or Fitting. If not is the clearance between the Cover(s) and the Pipe according to the Cover manufacturer’s instructions, or at least 1.5 X the ID of the pipe?

Is the Single Outlet:
A) An Equalizer Line piped through the second port of a skimmer?
B) a Venturi Debris Removal System,
C) a Channel Outlet at Least 3" Wide by 31" Long?

Is there a dedicated Vacuum Cleaner Fitting?

Is there a Fitting Lid (cover) Tested & Listed by a Nationally Recognized Testing Laboratory in accordance with IAPMO - SPS 4?

Install or Replace with Fitting Lid Tested to: IAPMO - SPS 4

Any Flat & Flush Mount Covers Smaller than 12" X 12"?

Are the center to center distance between the suction pipes at Least 36-inches, or on a separate plane. See Sections 4.5 & 4.6.

Engineered Vent Systems in accordance with Section 7.2

Manufactured Safety Vacuum Release System (SVRS) Tested & Listed for the purpose by a Nationally Recognized Testing Laboratory in accordance with Section 7.1.

Permanently Disable the Single Outlet, provided the system piping and skimmer(s) shall be capable of handling the full system flow and minimum turnover rates are achieved.

Is the Cover(s) mounted on a manufactured Sump or Fitting. If not is the clearance between the Cover(s) and the Pipe according to the Cover manufacturer’s instructions, or at least 1.5 X the ID of the pipe?

Is the Single Outlet:
A) An Equalizer Line piped through the second port of a skimmer?
B) a Venturi Debris Removal System,
C) a Channel Outlet at Least 3" Wide by 31" Long?

Is there a dedicated Vacuum Cleaner Fitting?

Is there a Fitting Lid (cover) Tested & Listed by a Nationally Recognized Testing Laboratory in accordance with IAPMO - SPS 4?

Install or Replace with Fitting Lid Tested to: IAPMO - SPS 4

Any Flat & Flush Mount Covers Smaller than 12" X 12"?

Are the center to center distance between the suction pipes at Least 36-inches, or on a separate plane. See Sections 4.5 & 4.6.

Engineered Vent Systems in accordance with Section 7.2

Manufactured Safety Vacuum Release System (SVRS) Tested & Listed for the purpose by a Nationally Recognized Testing Laboratory in accordance with Section 7.1.

Permanently Disable the Single Outlet, provided the system piping and skimmer(s) shall be capable of handling the full system flow and minimum turnover rates are achieved.

Is the Cover(s) mounted on a manufactured Sump or Fitting. If not is the clearance between the Cover(s) and the Pipe according to the Cover manufacturer’s instructions, or at least 1.5 X the ID of the pipe?

Is the Single Outlet:
A) An Equalizer Line piped through the second port of a skimmer?
B) a Venturi Debris Removal System,
C) a Channel Outlet at Least 3" Wide by 31" Long?
Finding the Maximum Flow Rate of an Existing System

(When an accurate flow meter is not installed)

Preparation:
1. Open all valves to their full open position for pool or spa circulation.
2. Remove Eye-ball fittings from Return Inlets (if applicable)
3. Clean Skimmer and Pump Baskets
4. Backwash or Clean Filter

Method 1: Measure using a 5 gallon Bucket and stopwatch
1. If necessary, using known 1 gallon or smaller containers, fill a 5 gallon bucket with exactly 5 gallons of water and mark a line on the inside of the bucket at the water level
2. Turn on pump and operate until it is running with a full prime
3. Using the backwash valve or waste valve and stopwatch record seconds required to fill the 5 gallon bucket to the line previously established.
4. Divide 60 by the number of seconds established above and multiply the result by 5. This will give you the maximum possible GPM of the system.
5. Repeat Test several times to verify results.

EXAMPLE: If it takes 10 seconds to fill a 5 gallon bucket, the GPM flow rate would be:

\[(60 \text{ seconds per minute} / 10 \text{ seconds}) \times 5 \text{ gallons} = 30 \text{ Gallons per Minute} \]

Method 2: Calculate using pressure and vacuum gage readings (see figure 1)
1. Install a vacuum gage as close to the bottom of the strainer basket as possible
2. Install a pressure gage as close to the pump discharge as possible

NOTE: It may be necessary to use a ¼” NPT x Barb fitting with a short section of plastic tubing connected to a gage if gages cannot be screwed into drain holes provided in pump.
3. Multiply Vacuum reading by 1.13 and record reading
4. Multiply Pressure reading by 2.31 and record reading
5. Add results of step 3 and 4 together to get the approximate Total Dynamic Head (TDH) in feet of water.
6. Using the published curve for the pump find the maximum possible GPM of the system.

EXAMPLE: If the Pressure Gage reads 14 PSI and the Vacuum Gage reads 6 inches of mercury (Hg)

\[\text{Total Dynamic Head} = 95.31 \times \text{GPM} \]

Gravity Flow Calculation

\[\text{Flow(gpm)} = \sqrt{\frac{1786 \times D \times H}{L}} \]

Example: Gravity flow through 2” IPS Schedule 40 PVC pipe with inside diameter 2.067" with 32.0 feet of pipe and 2 elbows of equivalent length of 6.0 feet. The top of the pipe opening into the collector tank is 8” below pool water level.

The flow (Q) in gpm is

\[Q = \sqrt{\frac{1786 \times 2.067 \times 8}{32 + (2 \times 6)}} = 12 \times 12 = 144 \text{ inches} \]

When inspecting existing installations, the maximum possible flow rate of the suction system must be determined as explained in this checklist and in ANSI/ APSP-7 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins.

Appendix B - Field checklist for identifying suction entrapment hazards

(This appendix is not part of the American National Standard ANSI/APSP-7 2006 but is included for information only.)

Introduction

This Field checklist for identifying suction entrapment hazards provides information and a systematic process that will help identify and eliminate suction entrapment hazards in swimming pools, wading pools, spas, hot tubs, and catch basins. This information and system is intended to address the hazards of hair entrapment, limb entrapment, body suction entrapment, evisceration/disembowelment, and mechanical entrapment. It does not replace or supersede the information in the body of the ANSI/APSP-7 standard. These guidelines are intended for use in inspecting, maintaining, and upgrading residential and public swimming pools, wading pools, spas, hot tubs, and catch basins. They are appropriate for use by service companies, builders, installers, facility owners/operators, home inspection specialists, parks and recreation personnel, and others who are responsible for pool and spa safety.

Reference numbers next to each block are used to facilitate telephone discussion. Mark tracking boxes with “X” to clearly document the current condition and actions need and/or taken.

DANGER! TO AVOID SERIOUS INJURY OR DEATH, CLOSE THE POOL OR SPA TO BATHERS IF ANY SUCTION OUTLET COVER/GRATE IS MISSING, BROKEN OR INOPERATIVE.