

Finding the Maximum Flow Rate of an Existing System

Preparation:

1. Open all valves to their full open position for pool or spa circulation. (For secured systems, do not adjust valves.)
2. Remove eyeball fittings from return inlets (when removable by hand).
3. Clean skimmer and pump baskets. Turn off skimmer to isolate outlet, if possible.
4. Backwash or clean sand filter/DE grids, or remove cartridge.

When inspecting existing installations, the maximum possible flow rate of suction system must be determined as explained in 4.4.9.*.

Pump Method 1: Measure flow rate with a flow meter accurate to ±10% (see Section 4.4.9).*

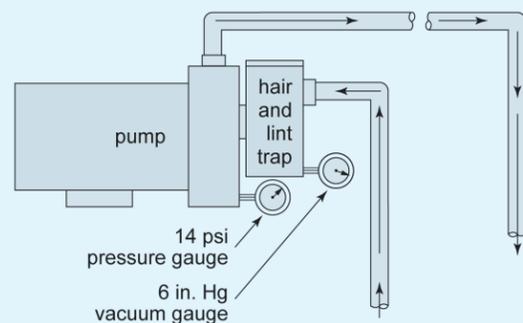
Pump Method 2: Calculate using pressure and vacuum gauge readings (see diagram below).

1. Install a vacuum gauge as close to the bottom of the strainer basket as possible.
2. Install a pressure gauge as close to the pump discharge as possible. NOTE: It may be necessary to use a National Pipe Thread (NPT) × barb fitting with a short section of plastic tubing connected to a gauge if gauges cannot be screwed into drain holes provided in pump.
3. Multiply vacuum reading by 1.13 and record.
4. Multiply pressure reading by 2.31 and record.
5. Add results of steps 3 and 4 together to get the approximate Total Dynamic Head (TDH) in feet of head.
6. Using the published curve for the pump, find the Total Dynamic Head calculated above on the vertical axis, and read the flow rate on the horizontal axis.
7. This will give you the maximum flow rate within approx. 10%.

Pressure head: gauge psi × 2.31 = feet of water

Suction head: gauge inches Hg × 1.13 = feet of water

EXAMPLE: If the pressure gauge reads 14 psi and the vacuum gauge reads 6 inches of mercury (Hg), the approximate Total Dynamic Head (TDH) of the system would be 39.12 feet.



$$\begin{aligned} \text{Pressure Head} &= 14 \text{ psi} \times 2.31 = 32.34 \text{ feet} \\ \text{Suction Head} &= 6 \text{ in. Hg} \times 1.13 = 6.78 \text{ feet} \\ \text{Total Dynamic Head} &= 39.12 \text{ feet} \end{aligned}$$

Gravity Flow Calculation

$$\text{Flow (gpm)} = \sqrt{\frac{1786 \times [D \text{ (inch)}]^5 \times H \text{ (inch)}}{L \text{ (inch)} + [55 \times D \text{ (inch)}]}}$$

(Where 55 D accounts for energy loss of stream)

EXAMPLE: Gravity flow through 2" IPS Schedule 40 PVC pipe with an inside diameter of 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.

$$\text{Flow (gpm)} = \sqrt{\frac{1786 \times [2.067]^5 \times 8}{[32 + (2 \times 6)] \times 12 + [55 \times 2.067]}} = 29 \text{ gpm}$$

Cover/Grate Audit

Existing Pump _____
Manufacturer Model

Pool Volume _____
Gallons

Filter _____
Manufacturer Model Size (Sq. Ft.)

Existing Cover _____
Manufacturer Model GPM

Pressure _____ Vacuum _____
PSI Inches of Hg

TDH _____ System Flow _____ (from Pump Curve)
Feet of water GPM

Maximum Flow _____
GPM

New Cover _____
Manufacturer Model GPM

Replacement Date ____/____/____

Maximum Drawdown _____
(Calculated)

Measured Measured Measured Measured

NOTE: Check cover manufacturer's installation instructions for the following items per ANSI/APSP-16.**

- Cover compatible with sump
- Attachments (hardware/screws)
- Field fabricated sump as specified by cover manufacturer



ANSI/APSP/ICC-7 2013

American National Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs And Catch Basins

This Appendix is not part of the American National Standard ANSI/APSP/ICC-7 2013 but is included for information only. Additional copies of the ANSI/APSP/ICC-7 standard and this Appendix can be purchased by contacting APSP Member Services at 703.838.0083, ext. 301.

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/ICC-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 the tracking boxes with an × to clearly document the current condition and actions needed 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.

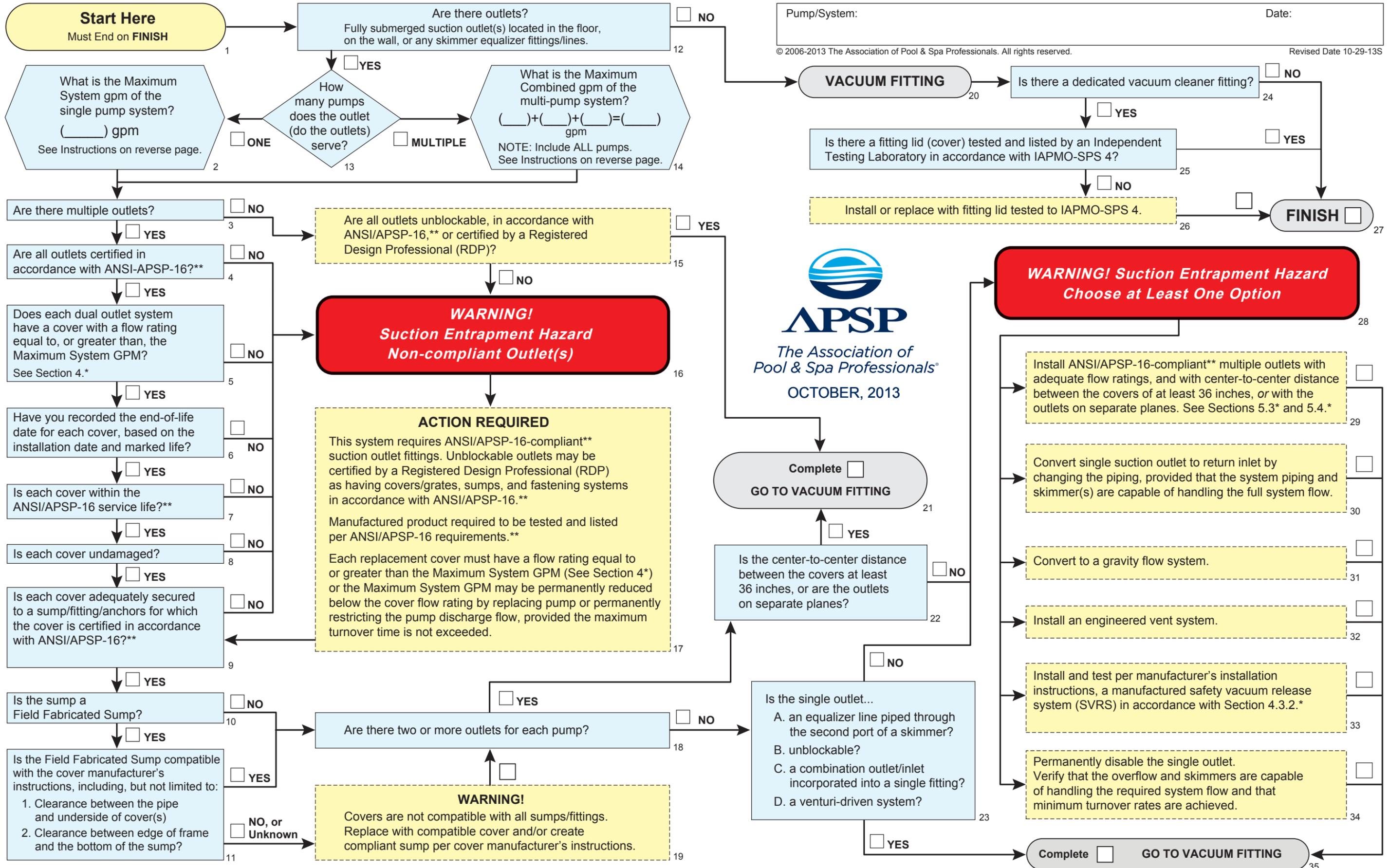
Company _____ Pool _____
 www. _____ Pump System _____
 Address _____ Address _____
 City _____ City _____
 State _____ Zip _____ State _____ Zip _____
 Date _____ Phone _____ Date _____ Phone _____
 Inspected by _____ Owner/Operator _____

EVALUATION / ACTIONS TAKEN

Inspector _____ (Print Name) _____
 _____ (Signature) _____ (Date)

Owner/Operator _____ (Print Name) _____
 _____ (Signature) _____ (Date)

The provisions described herein are not intended to prevent the use of any alternative configuration or system, provided any such alternative meets the intent and requirements of these Guidelines.



* Unless explicitly noted, all section numbers refer to ANSI/APSP/ICC-7 2013.

** All references to ANSI/APSP-16 mean ANSI/APSP-16

Sor ASME A112.19.8 2007 or VGB 2008.