**Start Here**
Must End on **FINISH**
1

Are there Outlets?
Fully Submerged Suction Outlet(s) located in the Floor, on the Wall or any Skimmer Equalizer Fittings/Lines.
11

☐ NO

☐ YES

How Many Pumps Does the Outlet(s) Serve
12

☐ ONE

What is the Maximum System GPM of the Single Pump System?
(_____) GPM
See: Instructions on back page.
2

☐ MULTIPLE

What is the Maximum Combined GPM in the Multi-Pump System?
(___)+(___)+(___)=(____)
**GPM**
*NOTE: Include ALL Pumps.*
*See: Instructions on back page.*
13

Are Outlets 24" X 24" or Larger?
3

☐ YES

Outside the scope of this Standard.
Consult a Licensed Professional Engineer
14

☐

☐ NO

Are all Outlets Listed to ASME/ANSI A112.19.8?
4

☐ NO

☐ YES

Does each Outlet have a Cover with a Flow Rating Equal to, or Greater than the *Maximum **System** GPM*?
**NOTICE: See Section 4.6**
5

☐ NO

☐ YES

Is each Cover Undamaged and without Surface Crazing, Environmental / UV Degradation?
6

☐ NO

☐ YES

Any Flat & Flush Mount Covers Smaller than 12" X 12"?
7

☐ YES

☐ NO

Cover Properly Secured per the Manufacturer?
8

☐ YES

☐ NO

**Secure Covers**
Mounting Rings & Hardware.
May Require Replacement
To Properly Secure Cover(s).
9

☐

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?
10

☐ YES

☐ NO

**WARNING!**
**Suction Entrapment Hazard**
15

Replace with Cover(s)
Listed by a Nationally Recognized Testing Laboratory in accordance with
ASME/ANSI A112.19.8
*Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs.* (See Section 4.5)

**NOTICE**:
Do not use Flat Flush-Mount Cover/Grates

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.
16

☐ YES

Are there Two or More Outlets per Pump(s)?
17

☐ NO

☐

Replace with appropriate Cover and/or create compliant sump.
18

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**Pump/System:** **DATE:**

**VACUUM FITTING**
19

Is there a dedicated Vacuum Cleaner Fitting?
23

☐ NO

☐ YES

Is there a Fitting Lid (cover) Tested & Listed by a Nationally Recognized Testing Laboratory in accordance with IAPMO - SPS 4?
24

☐ YES

☐ NO

Install or Replace with Fitting Lid Tested to: IAPMO - SPS 4
25

☐

**FINISH** ☐
26

**Complete** ☐
**GO TO VACUUM FITTING**
20

☐ YES

Is the center to center distance between the suction pipes at Least 36-inches, or are the Outlets on Separate Planes?
21

☐ NO

☐ NO

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?
22

☐ YES

**WARNING! Suction Entrapment Hazard**
**Choose at Least One Option**
27

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.
28

☐

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.
29

☐

Convert to a Gravity Flow System in accordance with Section 5.8
30

☐

Engineered Vent Systems in accordance with Section 7.2
31

☐

Install & Test.
Manufactured Safety Vacuum Release System (SVRS) Tested & Listed for the purpose by a Nationally Recognized Testing Laboratory in accordance with Section 7.1.
32

☐

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.
33

☐

**Complete** ☐ **GO TO VACUUM FITTING**
34

# 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 seconds per minute /10 seconds) x 5 gallons = 30 Gallons per Minute

**Method 3:** Use the maximum pump flow rate specified by the manufacturer.

## Gravity Flow Calculation

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

**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

$$Q = \sqrt{\frac{1786 \text{x} 2.067^5 \text{ x} 8}{[32+(2\text{x}6)]\text{x}12}}$$

$$Q = 31.95\, gpm$$

**Method 2: Calculate using pressure and vacuum gage readings (see figure 1)**

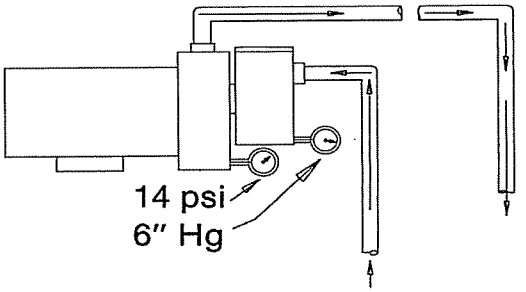
1. Install a vacuum gage as close to the bottom of the strainer basket as possible
2. Install a pressure gage as close to the pump discharge as possible

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 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 approximately 10%

**Pressure Head: Gage PSI x 2.31 = Feet of Water**
**Suction Head: Gage "Hg x 1.13 = Feet of Water**

**EXAMPLE: If the Pressure Gage reads 14 PSI and the Vacuum Gage reads 6 " inches of mercury (Hg) the approximate Total Dynamic Head (TDH) of the system would be 39.12 feet**




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.*



FOLD