

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

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

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

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

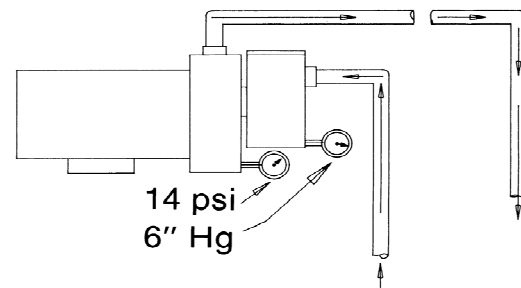
$$Q = 31.95 \text{ gpm}$$

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 1/4" 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.*

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.

Company: _____ www. _____
Address: _____
Inspection By: _____ Date: _____ Phone: _____

Pool: _____ Pump/System: _____
Address: _____
Owner / Operator: _____ Date: _____ Phone: _____

Evaluation / Actions Taken

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.