

Use of Gauges to Ensure Proper Pump Function

Environmental Health Services (EHS) and pool professionals rely on the information that vacuum and pressure gauges provide whenever:

- ◆ A new pool is constructed,
- ◆ A pump is replaced on an existing pool, or
- ◆ Additional features are added to an existing pool.

The California Building Standards Code, Title 24, Chapter 31B, requires a pressure and vacuum gauge to be installed on every public pool pump system. These requirements are regulated and enforced by local Environmental Health agencies. The pressure gauge is used to measure return pressure in pounds per square inch (PSI) and the vacuum gauge is used to measure suction in inches of mercury (Hg).

The pressure and vacuum gauge readings are necessary to calculate the Total Dynamic Head (TDH) of a pool system. TDH is:

- ◆ The amount of resistance when fluid is moving in a hydraulic system.
- ◆ The pressure required to overcome elevation differences and friction losses in order to produce a required pressure output.
- ◆ Required to properly determine the correct pool pump size and its ability to circulate water through the pool's hardware and plumbing system.

When pool water flows through the recirculation system, resistance to that flow is created in the pipes, valves, fittings, pool filter and anything in the flow path.

To calculate TDH:

Step	Action
1	Ensure the filter is backwashed before beginning.
2	Read the pressure and vacuum gauges and record the PSI and inches Hg.
3	Multiply the vacuum gauge reading by 1.13 to convert to feet of water.
4	Multiply the pressure gauge reading by 2.31 to determine pump head in feet of water.
5	Add both figures to determine the TDH.

Example: 12 inches Hg read at vacuum gauge and 25 PSI read at pressure gauge.

$$12 \times 1.13 = 14 \text{ feet of water}$$

$$25 \times 2.31 = 58 \text{ pump head in feet of water}$$

$$14 + 58 = 72 \text{ TDH.}$$

After determining the TDH, a pump performance curve (TDH versus flowrate) for the proposed pump is calculated to determine the relative flowrate (gallons per minute) that the selected pump is capable of delivering. EHS will determine if this flowrate meets the required limits based on the minimum turnover time and the maximum flow velocity of the pipe.



Compound



Vacuum Gauge

Vacuum Gauge FAQ's

Q: What is the purpose of the vacuum and pressure gauges?

A: The readings from the vacuum and pressure gauges are used to determine the Total Dynamic Head (TDH) on the pool system. TDH may be used to verify the pool pump and filter are correctly configured on an existing pool.

Q: Which pumps are required to have a vacuum gauge?

A: All booster and recirculation pumps are required to have a vacuum gauge.

Q: My Safety Vacuum Release System (SVRS) has a vacuum reading. Does this meet the requirement?

A: Pumps with an adjustable Vacless SVRS meet the requirement as they do not require a separate gauge. The reading may be taken from the Vacless gauge. Other SVRS devices do not meet the requirement as the reading may not be as accurate as a standard vacuum gauge.

Q: Where should the vacuum and pressure gauges be inserted?

A: The pressure and vacuum gauges are inserted into the two drain plug ports at the base of the pump housing.

- ◆ The vacuum gauge is inserted on the suction side of the pump, usually below the strainer basket.
- ◆ The pressure gauge is inserted on the pressure side of the pump, usually under the impeller. The "Pool Code" no longer requires an influent gauge for the filter. However, if that gauge exists, it may be used in lieu of the pressure gauge attached to the pump.

Things to Remember:

- ◆ Most pumps operate around 8 Hg.
- ◆ A zero rating is rare and may indicate the gauge is not working properly. If a gauge is installed in the wrong location the reading may also be zero.
- ◆ If the needle on a gauge is fluctuating up and down, it may mean the pump has lost its prime or the SVRS has tripped.
- ◆ Some pumps may have a compound gauge that reads the pressure (PSI) and the vacuum (Hg). A compound gauge installed on the suction side of a pump will read the vacuum only.
- ◆ Some gauges will read negative inches Hg. There is no need to write a negative symbol; a vacuum is negative pressure.