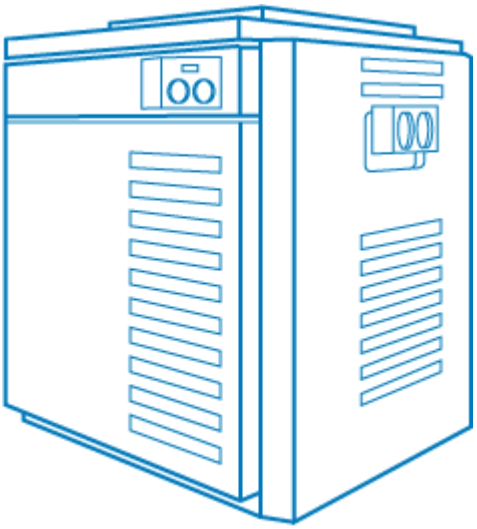


Gas pool heater

Gas-fired pool heaters remain the most popular system for heating swimming pools. Today you can find new gas-fired heater models with much higher efficiencies than older models. Still, depending on your climate and pool use, they may not be the most energy-efficient option when compared to heat pump and solar pool heaters.

How They Work

Gas pool heaters use either natural gas or propane. As the pump circulates the pool's water, the water drawn from the pool passes through a filter and then to the heater. The gas burns in the heater's combustion chamber, generating heat that transfers to the water that's returned to the pool.

They're most efficient when heating pools for short periods of time, and they're ideal for quickly heating pools. Therefore, gas pool heaters can be a good choice for pools that aren't used on a regular basis. Unlike heat pump and solar pool heaters, gas pool heaters can maintain any desired temperature regardless of the weather or climate.

Selecting a Gas Pool Heater

When selecting a gas swimming pool heater, you need to consider the following:

Size
Efficiency
Costs.

Sizing a Gas Pool Heater

You should have a trained pool professional perform a proper sizing analysis for your specific swimming pool to determine pool heater size.

Sizing a gas pool heater involves many factors. Basically, a heater is sized according to the surface area of the pool and the difference between the pool and the average air temperatures. Other factors also affect the heating load for outdoor pools, such as wind exposure, humidity levels, and cool night temperatures. Therefore, pools located in areas with higher average wind speeds at the pool surface, lower humidity, and cool nights will require a larger heater.

Gas pool heaters are rated by Btu (British thermal unit) output. Outputs range from 75,000 Btu to 450,000 Btu.

To calculate an approximate heater size for an outdoor swimming pool, follow these steps:

Determine your desired swimming pool temperature.
Determine the average temperature for the coldest month of pool use.
Subtract the average temperature for the coldest month from the desired pool temperature. This will give you the temperature rise needed.

Calculate the pool surface area in square feet.
Use the following formula to determine the Btu/hour output requirement of the heater:
Pool Area x Temperature Rise x 12
This formula is based on 1º to 1-1/4ºF temperature rise per hour and a 3-1/2 mile per hour average wind at the pool surface. For a 1-1/2ºF rise multiply by 1.5. For a 2ºF rise multiply by 2.0.

Determining Efficiency of a Gas Pool Heater

New gas swimming pool heaters have a standard test they go through to determine their energy efficiency based on their Btu (British thermal unit) output.
Heater efficiency is the ratio of usable output to energy input. For example, an 80%-efficient heater uses $80 worth of useful heat for every $100 worth of fuel. Therefore, it wastes 20% of the fuel.
Most gas pool heaters feature their efficiency percentage on their nameplates. A pool heater's manufacturer can also provide its efficiency percentage.
Today, you'll find some gas pool heaters with 89%–95% efficiency. The following table shows how much you can save for every $1,000 in annual pool heating costs by installing a gas pool heater that's 95% efficient.

Table 1. Costs of Outdoor Pool Gas Heating by Location*

Location	Season	Temperature		
		78°	80°	82°
Miami	1/1–12/31	$2136	$2848	$3600
w/cover	1/1–12/31	$416	$584	$800
Phoenix	3/1–10/31	$1384	$1776	$2216
w/ cover	3/1–10/31	$96	$168	$256
Dallas	4/1–10/31	$1512	$1920	$2456
w/ cover	4/1–10/31	$184	$280	$408
Atlanta	4/1–10/31	$1704	$2248	$2880
w/ cover	4/1–10/31	$320	$424	$592
Los Angeles	5/1–10/31	$1864	$2376	$2904
w/ cover	5/1–10/31	$168	$304	$472
Kansas City	5/1–10/31	$1434	$1872	$2384
w/ cover	5/1–10/31	$288	$416	$544
New York	5/1–9/30	$1448	$1904	$2384
w/ cover	5/1–9/30	$208	$296	$400
Chicago	5/1–9/30	$1621	$2072	$2536
w/ cover	5/1–9/30	$216	$296	$384
Denver	5/1–8/31	$1757	$2120	$2498
w/ cover	5/1–8/31	$123	$168	$243
Boston	5/1–8/31	$1712	$2096	$2504
w/ cover	5/1–8/31	$232	$328	$461
Minneapolis	6/1–9/30	$1331	$1776	$2176
w/ cover	6/1–9/30	$192	$248	$384
San Francisco	6/1–8/31	$1560	$1856	$2168

w/ cover	6/1–8/31	$192	$320	$472
Seattle	6/1–8/31	$1525	$1784	$2056
w/ cover	6/1–8/31	$304	$424	$552

*Figures based on a 1,000 square-foot, outdoor pool heated with an 80% efficient natural gas heater at $.80 per therm and uncovered for 8 hours per day.

If you're replacing a gas pool heater, you can use the following formula to determine your annual cost savings with a higher efficiency gas pool heater model:

Current Annual Cost x [1 – (Current Efficiency ÷ New Efficiency)]

Installation and Maintenance

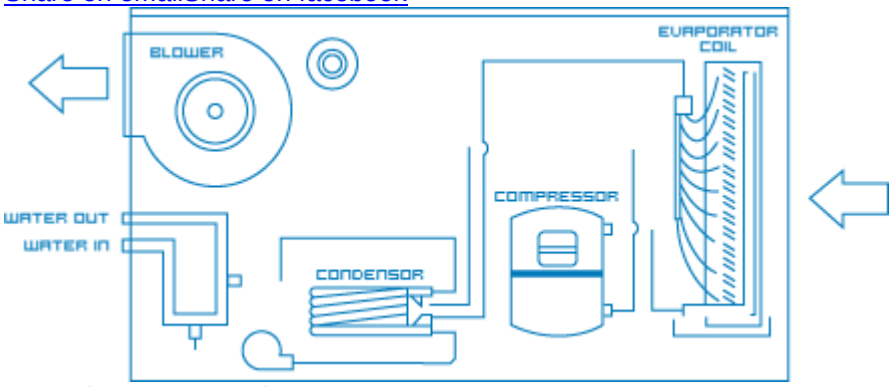
Proper installation and maintenance of your gas pool heater can optimize its efficiency. It's best to have a qualified pool professional install the heater and even perform complicated maintenance or repair tasks.

Read your owner's manual for a maintenance schedule and/or recommendations. You'll probably need to tune up your pool heater annually. Also, scaling in the burner or heat exchanger may decrease efficiency over a period of time.

With proper installation and maintenance, gas pool heaters typically last five or more years.

Heat Pump Swimming Pool Heaters

May 29, 2012 - 1:49pm



How a heat pump works.

How They Work

Heat pumps use electricity to capture heat and move it from one place to another. They don't generate heat.

As the pool pump circulates the swimming pool's water, the water drawn from the pool passes through a filter and the heat pump heater. The heat pump heater has a fan that draws in the outside air and directs it over the evaporator coil. Liquid refrigerant within the evaporator coil absorbs the heat from the outside air and becomes a gas. The warm gas in the coil then passes through the compressor. The compressor increases the heat, creating a very hot gas that then passes through the condenser. The condenser transfers the heat from the hot gas to the cooler pool water circulating through the heater. The heated water then returns to the pool. The hot gas, as it flows through the condenser coil, returns to liquid form and back to the evaporator, where the whole process begins again.

Higher efficiency heat pump pool heaters usually use scroll compressors versus the reciprocal compressors of standard units.

Heat pump pool heaters work efficiently as long as the outside temperature remains above the 45ºF–50ºF range. The cooler the outside air they draw in, the more energy they use. However, since most people use outdoor swimming pools during warm and mild weather, this usually isn't an issue.

Selecting a Heat Pump Pool Heater

Heat pump pool heaters cost more than gas pool heaters, but they typically have much lower annual operating costs because of their higher efficiencies. With proper maintenance, heat pump pool heaters typically last longer than gas pool heaters. Therefore, you'll save more money in the long run.

When selecting a heat pump pool heater, you should consider its:

Size

Efficiency

Costs.

Sizing a Heat Pump Pool Heater

You should have a trained pool professional perform a proper sizing analysis for your specific swimming pool to determine pool heater size.

Sizing a heat pump pool heater involves many factors. Basically, a heater is sized according to the surface area of the pool and the difference between the pool and the average air temperatures. Other factors also affect the heating load for outdoor pools, such as wind exposure, humidity levels, and cool night temperatures. Therefore, pools located in areas with

higher average wind speeds at the pool surface, lower humidity, and cool nights will require a larger heater.
Heat pump pool heaters are rated by Btu output and horsepower (hp). Standard sizes include 3.5 hp/75,000 Btu, 5 hp/100,000 Btu, and 6 hp/125,000 Btu.
To calculate an approximate heater size for an outdoor swimming pool, follow these steps:
Determine your desired swimming pool temperature.
Determine the average temperature for the coldest month of pool use.
Subtract the average temperature for the coldest month from the desired pool temperature. This will give you the temperature rise needed.
Calculate the pool surface area in square feet.
Use the following formula to determine the Btu/hour output requirement of the heater:
Pool Area x Temperature Rise x 12
This formula is based on 1º to 1-1/4ºF temperature rise per hour and a 3-1/2 mile per hour average wind at the pool surface. For a 1-1/2ºF rise multiply by 1.5. For a 2ºF rise multiply by 2.0.

Determining Heat Pump Swimming Pool Heater Efficiency

The energy efficiency of heat pump swimming pool heaters is measured by coefficient of performance (COP). The higher the COP number, the more efficient. However, there is no standard test for measuring the COP. Therefore, you really can't compare the COPs of different models unless you know that the manufacturers used the same test for each model. For example, the same heat pump will operate at a higher COP when the outside air temperature is higher. Typically, manufacturers measure the COP by testing a heat pump pool heater with an outdoor temperature of 80ºF and pool temperature of 80ºF. COPs usually range from 3.0 to 7.0, which converts to an efficiency of 300%–700%. This means that for every unit of electricity it takes to runs the compressor, you get 3–7 units of heat out of the heat pump.

Estimating Heat Pump Swimming Pool Heater Costs and Savings

For an outdoor swimming pool, use the following tables to help estimate your annual heat pump pool heater costs and savings compared to using an electric resistance or a gas pool heater. Table 1 estimates annual swimming heat pump pool heating costs by location, by water temperature, and with or without using a pool cover.

Table 1. Costs by Location of Heating Outdoor Pools with a Heat Pump* **Location**	**Season**	**Temperature**		
		78°	80°	82°
Miami	1/1–12/31	$1100	$1460	$1845
w/ cover	1/1–12/31	$215	$300	$410
Phoenix	3/1–10/31	$680	$875	$1090
w/ cover	3/1–10/31	$45	$85	$125
Dallas	4/1–10/31	$760	$970	$1240
w/ cover	4/1–10/31	$90	$140	$205
Atlanta	4/1–10/31	$840	$1110	$1425
w/ cover	4/1–10/31	$155	$205	$290
Los Angeles	5/1–10/31	$950	$1210	$1485
w/ cover	5/1–	$85	$155	$240

	10/31			
Kansas City	5/1–10/31	$715	$935	$1185
w/ cover	5/1–10/31	$145	$205	$270
New York	5/1–9/30	$740	$975	$1220
w/ cover	5/1–9/30	$105	$150	$200
Chicago	5/1–9/30	$810	$1035	$1270
w/ cover	5/1–9/30	$105	$150	$195
Denver	5/1–8/31	$875	$1055	$1245
w/ cover	5/1–8/31	$70	$100	$150
Boston	5/1–8/31	$875	$1075	$1280
w/ cover	5/1–8/31	$120	$165	$235
Minneapolis	6/1–9/30	$660	$850	$1040
w/ cover	6/1–9/30	$100	$125	$190
San Fran	6/1–8/31	$800	$950	$1110
w/ cover	6/1–8/31	$95	$165	$240
Seattle	6/1–8/31	$770	$900	$1035
w/ cover	6/1–8/31	$150	$215	$280

*Figures based on a 1,000 square foot, outdoor pool heated with an air to water heat pump with an average COP of 5.0 at $.085/kwh.

Table 2 estimates the annual savings of using a heat pump pool heater compared to using an electric resistance or gas pool heater.

Table 2. Annual Savings Comparisons of Gas and Electric Pool Heaters* **Efficiency**	**Annual Cost**	**Cost w/ 5.0 COP**	**Heat Pump Savings**
Gas Pool Heater			
55%	$584	$200	$384
60%	535	$200	$335
65%	494	$200	$294
70%	$459	$200	$259
75%	$428	$200	$228
80%	$402	$200	$202
85%	$378	$200	$178
90%	$357	$200	$157
95%	$338	$200	$138
Electric Resistance			
100%	$1000	$200	$800

*Based on an electric resistance heated pool, which costs $1,000 per year at an electric cost of $.085/kwh, and using a natural gas cost 0f $.80/therm. A seasonal average COP of 5.0 was used to determine heat pump savings.

Installation and Maintenance

Proper installation and maintenance of your heat pump pool heater can optimize its efficiency. It's best to have a qualified pool professional install the heater, especially the electric hookup, and perform complicated maintenance or repair tasks.

Read your owner's manual for a maintenance schedule and/or recommendations. You'll probably need to tune up your pool heater annually. Because of a heat pump pool heater's many moving and electrical parts, it will probably require periodic service by an air conditioning technician.

With proper installation and maintenance, heat pump pool heaters can last 10 or more years.