

## The Effects of Pressure on Boiling Point Temperatures

A system under pressure can handle higher temperatures, and offers a higher static boiling point. Most liquids have a specific "boiling point", which is the temperature at which the liquid begins to change to a gas. If pressure is applied to the liquid, it must become hotter before it can boil. Pure water in a cooling system will boil (at sea level) at 212° F. At higher altitudes, atmospheric pressure is less than at sea level. **Example: Water at 5,280 feet will boil at a mere 203° F.** A cooling system that is under 15 pounds of pressure however, will now allow the water to reach nearly 250° F before it can boil. Even at this temperature the water is able to circulate through the engine, cooling parts that are at a much higher temperature without the water boiling. As long as the coolant remains in liquid form it can do its job and transfer heat to the radiator or heat exchanger so it can be dissipated. Coolant that is boiling cannot transfer as much heat and overheating is likely to occur if the coolant turns to a gaseous state. Steam adjacent to a hot surface, such as a combustion wall, can actually act as an insulator - thus preventing any heat transfer to the coolant.

**For every pound of pressure exerted on the coolant in the system, the static boiling point of the coolant is raised by approximately 3° F**

### Effect of System Pressure on Boiling Point

Coolant	0 psi	4 psi	8 psi	12 psi	16 psi	20 psi	24 psi
Water	212F	225F	233F	242F	252F	260F	265F
33%	220F	230F	240F	253F	260F	268F	273F
44%	224F	234F	245F	257F	265F	272F	279F
60%	231F	241F	253F	264F	273F	280F	285F
50%	226F	236F	248F	259F	267F	275F	280F

Boiling Point of Coolant with Varying Percentages of Ethylene Glycol @t Atmospheric Pressure & @ 15 P.S.I.				
% E.G.	Atmospheric		15 PSI (103 kPa)	
	B.P. C	B.P. F	B.P. C	B.P. F
0	100C	212F	120C	248F
33	104C	219F	125C	257F
44	107C	224F	128C	262F
50	108C	227F	129C	265F
60	111C	232F	132C	270F

### Effect of System Pressure on Boiling Point

Coolant	0 psi	3psi	5 psi	10 psi	12 psi	15 psi	20 psi
<b>Water</b>	212°F	221°F	227°F	242°F	248°F	257°F	272°F
<b>PG Conc.</b>	323°F	332°F	338°F	353°F	359°F	368°F	383°F
<b>30%</b>	216°F	225°F	231°F	246°F	252°F	261°F	276°F
<b>40%</b>	219°F	228°F	234°F	249°F	255°F	264°F	279°F
<b>50%</b>	222°F	231°F	237°F	252°F	258°F	267°F	282°F

*(Pressures are calculated values and should not be interpreted as actual data)*