

Monday, November 4,, 2019

# Centrifugal Pump Gauge Readout Corrections for Hydronic Glycol Systems

Monday Morning Minutes | by Norm Hall, November 4, 2019

Ask any test/balance or service technician in the hydronic HVAC world to convert PSIG to feet of head and the multiplier of 2.31 is the immediate response. It is one of the simple formulas we learn early in our careers. There are times when that number changes enough to make a difference and hydronic glycol systems are one of those times.



The formula for the conversion of gauge readings to feet of head is:

$$\text{FEET} = (\text{PSIG} \times 2.31) / \text{SPECIFIC GRAVITY}$$

Specific gravity is normally close to one for water but not so in glycol systems. Here are some helpful tables I made for your use. Let's look at the tables and then I'll explain how much of a difference they can make.

R. L. DEPPMANN CHART - PROPYLENE GLYCOL		
MULTIPLIER TO GET FROM PSIG TO FEET OF HEAD FOR HYDRONIC SYSTEMS		
FEET OF HEAD = PSIG X M (M is the multiplier from chart)		
% Propylene Glycol	(M) 35°F to 120°F	(M) 121°F to 190°F
0	2.31	2.36
20	2.25	2.31
25	2.23	2.30
30	2.22	2.29
35	2.21	2.28
40	2.20	2.27
45	2.19	2.26
50	2.18	2.25

a) Chart accuracy or rounding is ± 0.02. b) Chart is based on the percentage by volume of DOWFROST™-HD mixed with water. 3) ®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

**R. L. DEPPMANN CHART - ETHYLENE GLYCOL**  
**MULTIPLIER TO GET FROM PSIG TO FEET OF HEAD FOR HYDRONIC SYSTEMS**

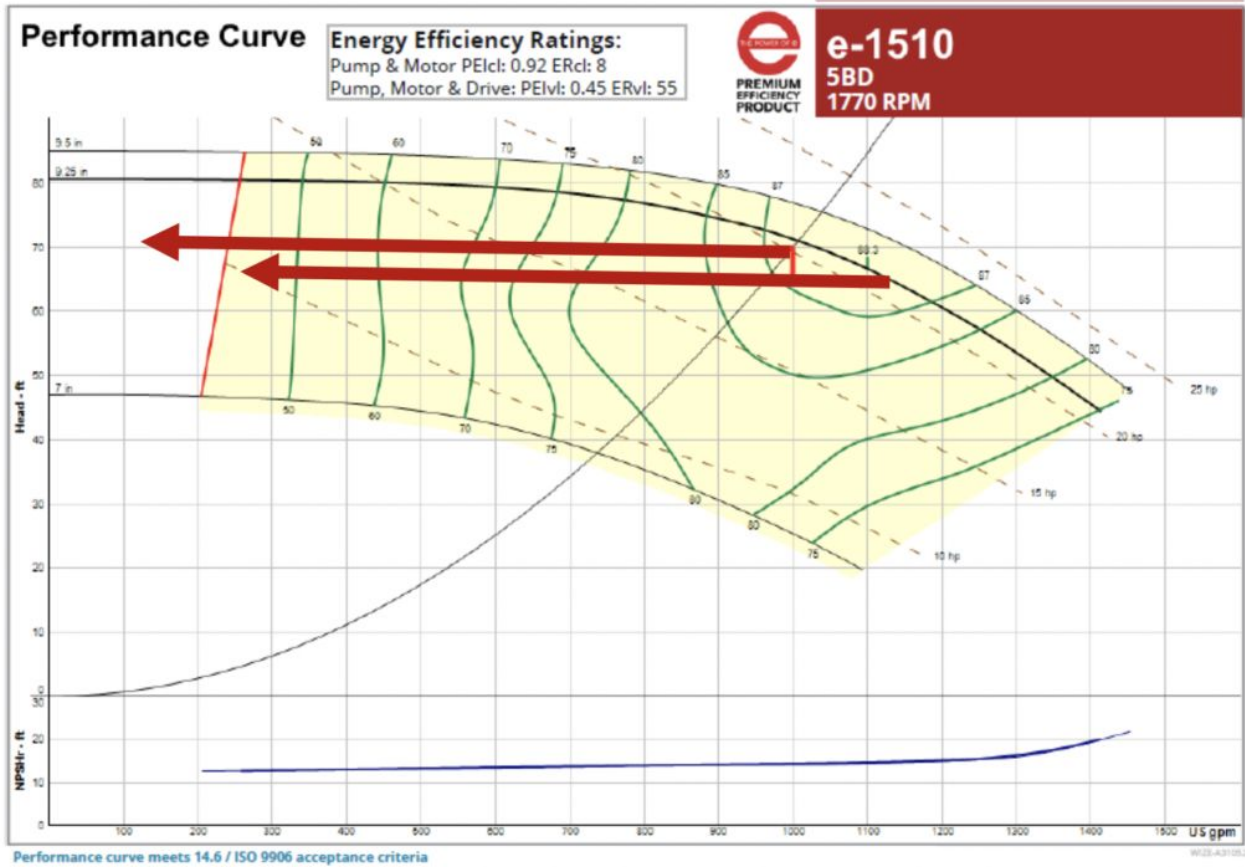
**FEET OF HEAD = PSIG X M** (M is the multiplier from chart)

<b>% Ethylene Glycol</b>	<b>(M) 35°F to 120°F</b>	<b>(M) 121°F to 190°F</b>
0	2.31	2.36
20	2.25	2.30
25	2.22	2.22
30	2.22	2.28
35	2.19	2.25
40	2.17	2.24
45	2.16	2.23
50	2.15	2.22

a) Chart accuracy or rounding is ± 0.02. b) Chart is based on the percentage by volume of DOWTHERM™-SR-1 mixed with water. c) ®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

**How much of a difference can it make in a test and balance report?**

Last week, the R. L. Deppmann Monday Morning Minutes explained [Velocity Head Correction](#) when reading out pumping systems. Sometimes it makes a difference and sometimes the difference is so small it is negligible. This specific gravity correction is similar. Let's look at an example curve for 1000 GPM at 70 feet from the [Bell & Gossett ESP-Systemwize](#) program. Assume the gauge differential was 30 PSIG. So,  $30 \times 2.31 = 69.3$  which looks close to our 70 feet of design. If the fluid was 50% propylene glycol at 40°F the formula would be  $30 \times 2.18 = 65.4$ .



## Velocity Head Correction when Reading a Gauge

This simple example shows the balance report would be off by 15%. This could make a difference. If the fluid was the same 50% fluid at 170°F the answer would be 67.5' head. Still a difference.... but not as much of a difference.

Engineers, balance technicians, service contractors and pump representatives should understand the effect of specific gravity and know when to use these handy tables for hydronic glycol systems, from the R. L. Deppmann Monday Morning Minutes.