Cooling Tower Pumps and Piping – Part 2

It’s all about Pressure.

By Norman Hall

Here at R. L. Deppmann, we receive a continuous barrage of questions regarding concern over NPSH (net positive suction head) and tower pump selections. It is the most confusing set of values shown on a pump curve. This week, let’s look at $NPSH_R$ or net positive suction pressure required by the pump.

Net positive suction head is the amount of ABSOLUTE pressure required inside the pump suction to make sure the water remains water and does not flash into vapor. Water boils into vapor at 212°F at 0 PSIG. We do this every time we put a pot on the stove to make pasta. Most tower systems are designed to create a maximum of 85°F. Water will not boil at 85°F unless we put it under a substantial gauge vacuum. So $NPSH_R$ is expressed in feet of ABSOLUTE pressure, not gauge pressure. Let’s look at an example.

Here is an example of a pump selection using a Bell and Gossett side suction, top discharge pump designed for 3000 GPM at 70 feet of head. The $NPSH_R$ curve is in red at the bottom. If you read up from 3000 GPM to that curve and across to the right, the $NPSH_R$ is 15 feet of absolute pressure or about 16” on a vacuum gauge.

Here is a curve you need to understand when looking at $NPSH_R$. The Hydraulic Institute (HI), in their publication of standards, defines NPSH that will cause the total head of the pump to be reduced by 3%, due to flow blockage from cavitation. It does not say that $NPSH_R$ is where cavitation begins. So what do we do with a statement like that!

Next week we continue this discussion of $NPSH_R$.

Click here to request a copy of the Xylem Bell and Gossett Cooling Tower Piping technical bulletin TEH-1075

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