



NPSHa Calculation for a Light Hydrocarbon

In this example, butane is at its boiling point inside a pressure vessel operating at 37.5 psig @ 100 F. There is 8 feet of liquid level head above the elevation of the pump's suction nozzle. You have calculated a 2.5 ft of head loss in the suction piping due to friction and decided that two (2) feet of NPSH margin is required to handle upset process conditions.

What NPSHa specification do you provide the pump supplier?

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PumpName = Butane Feed Pump
PumpNumber = P101
Butane
Pumping Temp (F)= 100.0
Barometric Pressure (psia) = 14.7
Pressure on surface of liquid (psig) = 37.5
Vapor pressure of liquid (psia) = 52.2
Specific gravity = 0.56
Elevation head (ft) = 8.0
Friction loss (ft) = 2.5
Required NPSH margin (ft) 2.0
P = (BarometricPressure + Pressureonsurfaceofliquid * 2.31) / (FluidSpecificGravity)
P = ((14.7 + 37.5) * 2.31) / (0.56)
P = (120.582) / (0.56)
P = 215.325
P = (BarometricPressure * 2.31) / (FluidSpecificGravity)
P = (14.7 * 2.31) / (0.56)
P = (33.957) / (0.56)
P = 60.6375
V = (VaporPressure * 2.31) / (FluidSpecificGravity)
V = (52.2 * 2.31) / (0.56)
V = (120.582) / (0.56)
V = 215.325
NPSHa = SurfaceminusVapor + ElevationminusFriction
NPSHa = 215.325minus215.325 + 8.0minus2.5
NPSHa = 5.5
NPSHa = (SurfaceminusVapor) + ElevationminusFrictionminusRequiredNPSH
NPSHa = (215.325minus215.325) + 8.0minus2.5minus2.0
NPSHa = 3.5 ft
```