Helix Technologies Pty Ltd

Project	New Project	Client	Helix QA
Project No.	4567	Design Date	14/03/2017
Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Network Type	Liquid	Calc. Method	Darcy
Description	Pump NPSH Available Example 3		

Pump NPSH Available Calculation ref. Cameron Hydraulic Data, 16th Ed pg 1-14 Exmple 3
Tank 10ft above pump has pipe with friction of 2.92ft and water at 212 deg F = boiling. Headloss of 2.92 ft in suction pipe is obtained by trial solving with different pipe length until Hf = 2.92 ft.
Altitude is set to 0 ft i.e atmospheric pressure is 14.7 psi (in Network settings). Liquid is set to Water at 212 deg F with Vapour pressure = atmospherice pressure i.e vapour pressue is 14.7 psi. Solve network.
Helix calculated NPSH available at pump = 7.08ft. Published result is 7.08 ft i.e good correlation.

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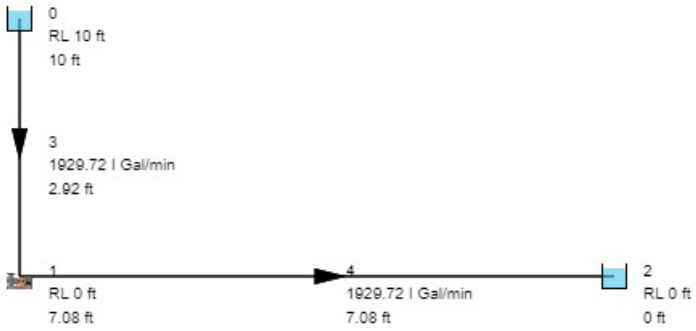

Pump NPSH Available Example 3

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Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Description	Pump NPSH Available Example 3		

Pipe No	3	From node to node	0 - 1
Description		Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	212 C	Density	998.2 kg/m3
Vapour Pressure	14.7 psi		
Pipe Description	Steel Pipes AS1836 (ANSI B36.10)	Pipe Class	
Nominal Diameter	10 in	Inside Diameter	10 in
Outside Diameter	11 in	Pipe Length	52.5 ft
Pipe Roughness	0.005 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	1929.72 l Gal/min	Velocity	9.47 ft/s
Friction Loss	1.53 ft	Fitting Losses	1.39 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	2.92 ft	Total Pressure Drop	1.26 psi
Entry Total Head	10 ft	Exit Total Head	7.08 ft
Entry Gauge Head	0 ft	Exit Gauge Head	7.08 ft
Reynolds No.	730146.67	Friction Factor	0.01738 (Darcy f)

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Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Description	Pump NPSH Available Example 3		

Pipe No	4	From node to node	1 - 2
Description		Equipment No	
Liquid	Water	Viscosity	1.002 cp
Temperature	212 C	Density	998.2 kg/m3
Vapour Pressure	14.7 psi		
Pipe Description	Steel Pipes AS1836 (ANSI B36.10)	Pipe Class	
Nominal Diameter	8 in	Inside Diameter	8 in
Outside Diameter	9 in	Pipe Length	40 ft
Pipe Roughness	0.005 in	Allowable Press.	150 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	1	Total Fittings kf	0
Flow Rate	1929.72 l Gal/min	Velocity	14.79 ft/s
Friction Loss	3.68 ft	Fitting Losses	3.4 ft
Slurry Losses	0 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	7.08 ft	Total Pressure Drop	3.06 psi
Entry Total Head	7.08 ft	Exit Total Head	0 ft
Entry Gauge Head	7.08 ft	Exit Gauge Head	0 ft
Reynolds No.	912683.31	Friction Factor	0.01804 (Darcy f)

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Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Description	Pump NPSH Available Example 3		

Node No	0	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	10 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	10 ft		

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Project	New Project	Client	Helix QA
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Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Description	Pump NPSH Available Example 3		

Node No	1	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	0 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	7.08 ft		
Pump Head	0 ft	Pump Flow Rate	1929.72 I Gal/min
Pump / Fan Efficiency	70 %	Pump Absorbed Power	0 hp
Casing Pressure	3.06 psi		
Pump NPSH required	6 ft	Pump NPSH available	7.08 ft

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Category	Demo Liquid Pump NPSH 3	Atmos. Press	14.7 psi
Description	Pump NPSH Available Example 3		

Node No	2	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	0 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	0 ft		