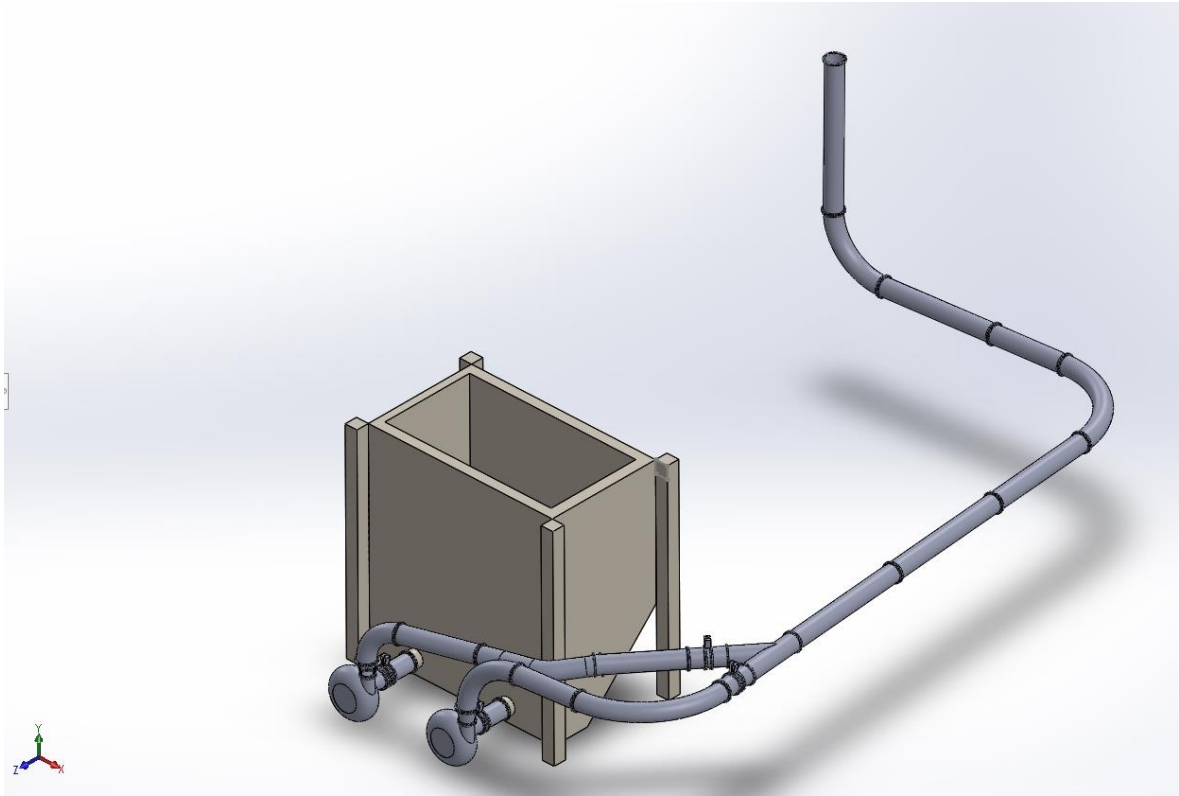


LAMPIRAN



Gambar 6.1 System Full Pemipaan PC 419 – 419

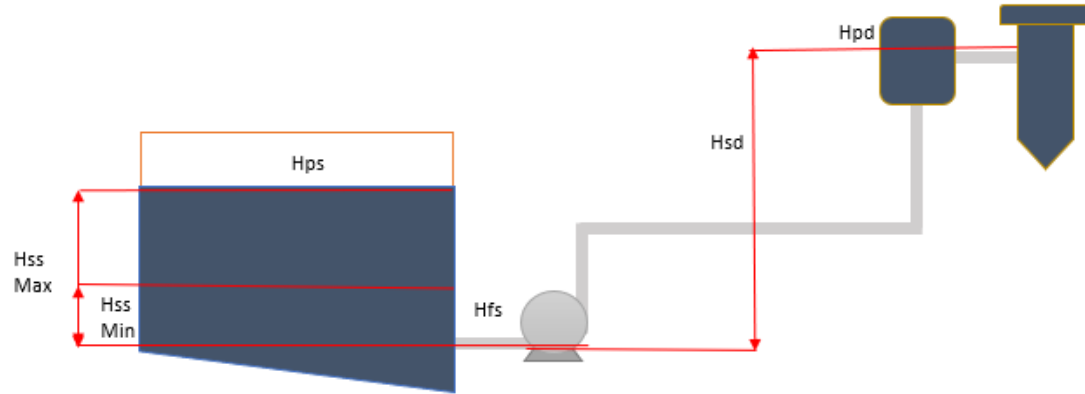
4.1. Pompa 2PC418 Tahun 97

Material Properties

Mixture Properties			
Parameters	Value	Units	Notes
Concentration by Weight	68.00%		<- Input
Concentration by Volume	43.15%		
S.G Fluid	1		<- Input
S.G Solid	2.8		<- Input
S.G Mixture	1.776649746		
Dynamic Viscosity Liquid (μ l)	0.001	Pa.s	<- Input
Dynamic Viscosity Mixture (μ m)	0.001304831	Pa.s	
Kinematic Viscosity Liquid (υ m)	1.23E-06	m^2/s	

Pump System

System Parameters			
Hps	0	m	
Hpd	5.624	m	
Hss Min	1.08727113	m	15%
Hss Max	7.031019974	m	97%
Hsd	15.91945	m	



System Parameters Cyclone Requirements		
Q Cyclone	22000	GPM
P Cyclone	10	Psi

Discharge Liner System

28" Pipe Carbon Steel STD - Rubber Lined			
Parameters	Value	Units	Notes
Pipe NPS	28	<i>Inch</i> <i>m</i>	0.7112
Pipe Wall Thickness	0.00953	<i>m</i>	
Liner Thickness	0.0254	<i>m</i>	
Pipe Inner Diameter CS	0.69194	<i>m</i>	
Pipe Inner Diameter w/ RBR	0.64114	<i>m</i>	
Pipe Cross Area	0.322682492	<i>m</i> ²	
Pipe Length	66.351162	<i>m</i>	
Pipe Absolute Roughness	0.0000762	<i>m</i>	Rubberlined
Number of Elbow			K-Factor
<i>Elbow-90</i>	0	<i>Ea.</i>	
<i>Elbow-45</i>	0	<i>Ea.</i>	0.6
<i>Ebow-90 LR</i>	0	<i>Ea.</i>	0.8
Number of Tee			K-Factor
<i>Tee / Lateral</i>	0	<i>Ea.</i>	0.8
<i>Tee / Branch</i>	0	<i>Ea.</i>	
Number of Reducer			K-Factor
<i>28"x20"</i>	1	<i>Ea.</i>	1
Number of Valves			K-Factor
<i>Gate Valve</i>	1	<i>Ea.</i>	0.6
<i>Globe Valve</i>	0	<i>Ea.</i>	
<i>Angle Valve</i>	0	<i>Ea.</i>	
<i>Ball Valve</i>	0	<i>Ea.</i>	

Suction Liner System

30" Pipe Carbon Steel STD - Rubber Lined			
Parameters	Value	Units	Notes
Pipe NPS	30	<i>Inch</i> <i>m</i>	0.762
Pipe Wall Thickness	0.00953	<i>m</i>	
Liner Thickness	0.0254	<i>m</i>	
Pipe Inner Diameter CS	0.74294	<i>m</i>	
Pipe Inner Diameter w/ RBR	0.69214	<i>m</i>	
Pipe Cross Area	0.376060357	<i>m</i> ²	
Pipe Length	1.340485	<i>m</i>	
Pipe Absolute Roughness	0.0000762	<i>m</i>	Rubberlined
Number of Elbow			K-Factor
<i>Elbow-90</i>	0	<i>Ea.</i>	
<i>Elbow-45</i>	0	<i>Ea.</i>	
<i>Ebow-90 LR</i>	0	<i>Ea.</i>	
Number of Tee			K-Factor
<i>Tee / Wye</i>	0	<i>Ea.</i>	
<i>Tee / Branch</i>	0	<i>Ea.</i>	
Number of Reducer			K-Factor
<i>30"x24"</i>	1	<i>Ea.</i>	1
Number of Valves			K-Factor
<i>Gate Valve</i>	1	<i>Ea.</i>	0.6
<i>Globe Valve</i>	0	<i>Ea.</i>	
<i>Angle Valve</i>	0	<i>Ea.</i>	
<i>Ball Valve</i>	0	<i>Ea.</i>	

Total Head Dynamic System

Flow (GPM)	THD Min Water (ft)	THD Max Water (ft)	TDH Min Slurry (ft)
0	67.11344988	47.61296093	60.60689252
2500	67.31486845	47.8143795	60.7202624
5000	67.8971469	48.39665794	61.04800198
7500	68.8553284	49.35483945	61.58732129
10000	70.18817226	50.68768331	62.33752198
12500	71.89512151	52.39463255	63.29829055
15000	73.97586788	54.47537892	64.46945351
17500	76.43021876	56.92972981	65.85090243
20000	79.25804374	59.75755478	67.44256392
22500	82.45924921	62.95876025	69.24438529
25000	86.03376505	66.5332761	71.25632706
27500	89.9815369	70.48104795	73.47835865
30000	94.30252146	74.8020325	75.91045567
32500	98.99668345	79.49619449	78.55259827
35000	104.0639936	84.56350466	81.40476999
37500	109.5044273	88.88600279	84.46695696
40000	115.3179635	95.81747455	87.73914733
42500	121.504584	102.0040951	91.22133087
45000	128.064273	108.563784	94.91349866
47500	134.9970165	115.4965275	98.81564285
50000	142.3028021	122.8023131	102.9277565

Pump Require

Flow (GPM)	THD Min (ft)	Hydraulic Power Required (kW)	Hydraulic Power Required (HP)
22000	68.86721026	507.4722606	680.5304509

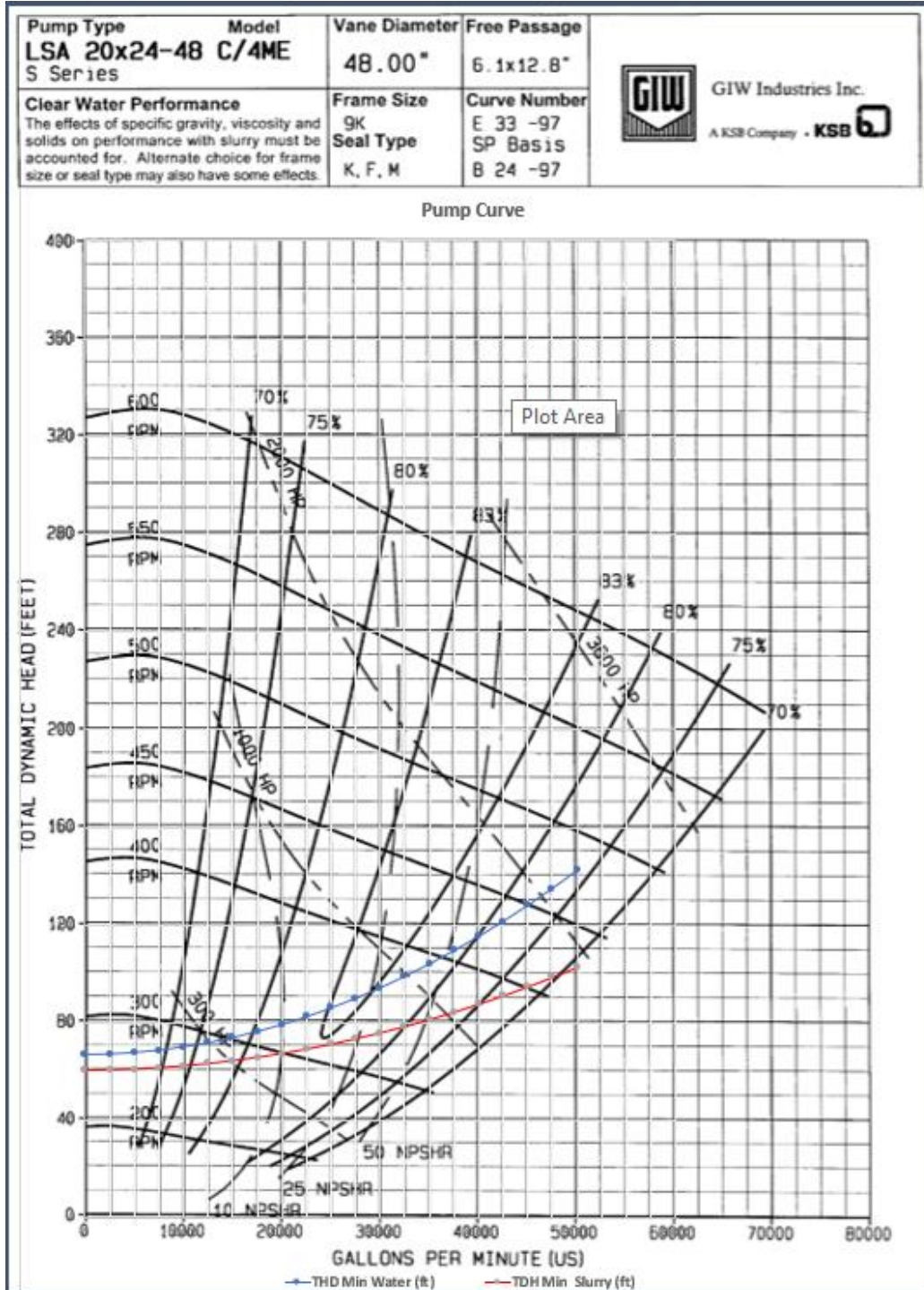
Flow (GPM)	THD Min (ft)	Shaft Power Required (kW)	Shaft Power Required (HP)	%
22000	68.86721026	611.4123622	819.9162059	83%

Motor Specification (HP)	Motor Specification (RPM)	Gear Box Ratio RPM	Max Speed Pump (RPM)
1500	1788	4.591	389.4576345

Limit Settling Velocity (FL)	Pipe NPS	Settling Velocity (m/s)	Velocity (m/s)
0.8763951	28"	4.170250387	4.301379943

NPSH-A (ft)	NPSH-R (Ft)	Flow Rate (GPM)
37.35981461	13	22000

Pump Curve



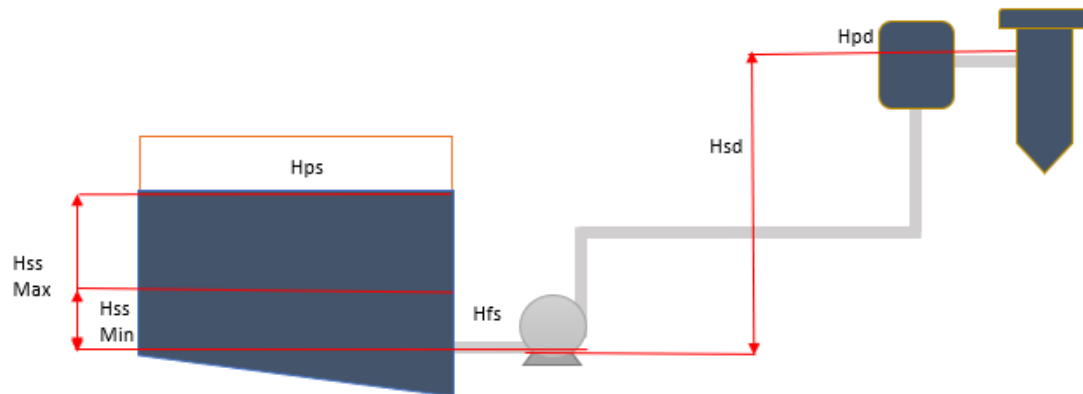
4.2. Pompa 2PC418 Tahun 18

Material Properties

Mixture Properties			
Parameters	Value	Units	Notes
Concentration by Weight	68.00%		<- Input
Concentration by Volume	43.15%		
S.G Fluid	1		<- Input
S.G Solid	2.8		<- Input
S.G Mixture	1.776649746		
Dynamic Viscosity Liquid (μ l)	0.001	<i>Pa.s</i>	<- Input
Dynamic Viscosity Mixture (μ m)	0.001304831	<i>Pa.s</i>	
Kinematic Viscosity Liquid (υ m)	1.23E-06	<i>m²/s</i>	

Pump System

System Parameters			
Hps	0	<i>m</i>	
Hp _d	5.624	<i>m</i>	
Hss Min	1.08727113	<i>m</i>	15%
Hss Max	7.031019974	<i>m</i>	97%
Hsd	15.91945	<i>m</i>	



System Parameters Cyclone Requirements		
Q Cyclone	22000	GPM
P Cyclone	10	Psi

Discharge Liner System

30" Pipe Carbon Steel STD - Rubber Lined			
Parameters	Value	Units	Notes
Pipe NPS	30	<i>Inch</i> <i>m</i>	0.762
Pipe Wall Thickness	0.00953	<i>m</i>	
Liner Thickness	0.0254	<i>m</i>	
Pipe Inner Diameter CS	0.74294	<i>m</i>	
Pipe Inner Diameter w/ RBR	0.69214	<i>m</i>	
Pipe Cross Area	0.376060357	<i>m</i> ²	
Pipe Length	46.932849	<i>m</i>	
Pipe Absolute Roughness	0.0000762	<i>m</i>	Rubberlined
Number of Elbow			K-Factor
<i>Elbow-90</i>	0	<i>Ea.</i>	
<i>Elbow-45</i>	3	<i>Ea.</i>	0.5
<i>Ebow-90 LR</i>	2	<i>Ea.</i>	0.8
Number of Tee			K-Factor
<i>Tee / Lateral</i>	1	<i>Ea.</i>	0.8
<i>Tee / Branch</i>	0	<i>Ea.</i>	
Number of Reducer			K-Factor
<i>30"x20"</i>	1	<i>Ea.</i>	0.8
Number of Valves			K-Factor
<i>Gate Valve</i>	1	<i>Ea.</i>	0.5
<i>Globe Valve</i>	0	<i>Ea.</i>	
<i>Angle Valve</i>	0	<i>Ea.</i>	
<i>Ball Valve</i>	0	<i>Ea.</i>	

Suction Liner System

30" Pipe Carbon Steel STD - Rubber Lined			
Parameters	Value	Units	Notes
Pipe NPS	30	<i>Inch</i> <i>m</i>	0.762
Pipe Wall Thickness	0.00953	<i>m</i>	
Liner Thickness	0.0254	<i>m</i>	
Pipe Inner Diameter CS	0.74294	<i>m</i>	
Pipe Inner Diameter w/ RBR	0.69214	<i>m</i>	
Pipe Cross Area	0.376060357	<i>m</i> ²	
Pipe Length	2.246313	<i>m</i>	
Pipe Absolute Roughness	0.0000762	<i>m</i>	Rubberlined
Number of Elbow			K-Factor
<i>Elbow-90</i>	0	<i>Ea.</i>	
<i>Elbow-45</i>	0	<i>Ea.</i>	
<i>Ebow-90 LR</i>	0	<i>Ea.</i>	
Number of Tee			K-Factor
<i>Tee / Wye</i>	0	<i>Ea.</i>	
<i>Tee / Branch</i>	0	<i>Ea.</i>	
Number of Reducer			K-Factor
<i>30"x24"</i>	1	<i>Ea.</i>	0.8
Number of Valves			K-Factor
<i>Gate Valve</i>	1	<i>Ea.</i>	0.5
<i>Globe Valve</i>	0	<i>Ea.</i>	
<i>Angle Valve</i>	0	<i>Ea.</i>	
<i>Ball Valve</i>	0	<i>Ea.</i>	

Total Head Dynamic System

Flow (GPM)	THD Min Water (ft)	THD Max Water (ft)	TDH Min Slurry (ft)
0	67.11344988	47.61296093	60.60689252
2500	67.361747	47.86125804	60.74664833
5000	68.09505998	48.59457102	61.15939878
7500	69.31064611	49.81015715	61.84360011
10000	71.00778653	51.50729757	62.79884772
12500	73.18615263	53.68566367	64.02495664
15000	75.84556089	56.34507193	65.52182357
17500	78.98589614	59.48540719	67.2893837
20000	82.60708027	63.10659131	69.32759305
22500	86.70905721	67.20856825	71.63642007
25000	91.29178499	71.79129603	74.21584114
27500	96.35523111	76.85474215	77.06583795
30000	101.8993697	82.39888078	80.18639598
32500	107.9241799	88.4236909	83.57750339
35000	114.4296441	94.92915514	87.23915041
37500	121.4157478	100.4795876	91.17132879
40000	128.8824786	109.3819896	95.37403153
42500	136.8298256	117.3293367	99.84725258
45000	145.2577796	125.7572906	104.5909867
47500	154.1663323	134.6658433	109.6052292
50000	163.5554764	144.0549875	114.889976

Pump Require

Flow (GPM)	THD Min (ft)	Hydraulic Power Required (kW)	Hydraulic Power Required (HP)
22000	71.15300648	524.315954	703.1181806

Flow (GPM)	THD Min (ft)	Shaft Power Required (kW)	Shaft Power Required (HP)	%
22000	71.15300648	639.4096999	857.4611958	82%

Motor Specification (HP)	Motor Specification (RPM)	Gear Box Ratio RPM	Max Speed Pump (RPM)
1500	1788	4.591	389.4576345

Limit Settling Velocity (FL)	Pipe NPS	Settling Velocity (m/s)	Velocity (m/s)
0.8763951	30"	4.33293994	3.690843702

NPSH-A (ft)	NPSH-R (Ft)	Flow Rate (GPM)
37.35981461	15	22000

Pump Curve

