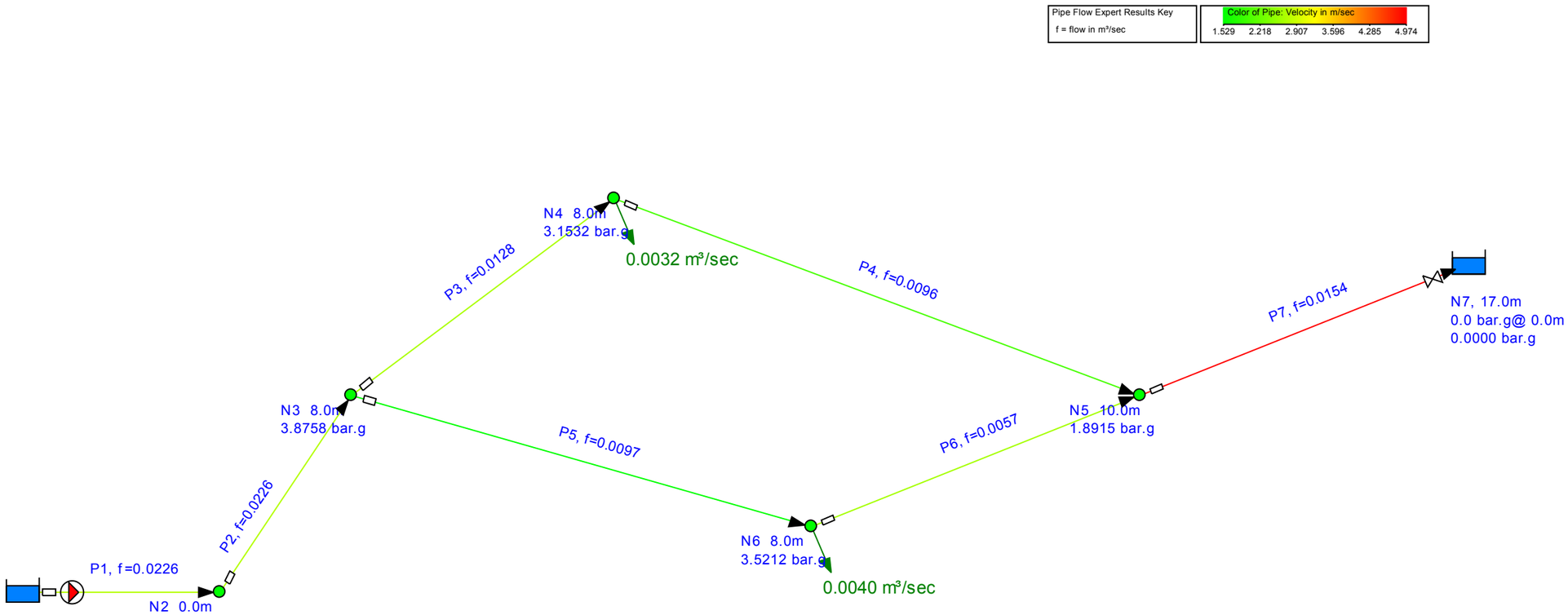
Pipe Flow Design 1

Results Data


Pipe Flow Expert Results Key
f = flow in m³/sec
Color of Pipe: Velocity in m/sec
1.529 2.218 2.907 3.596 4.285 4.974
N4 8.0m
3.1532 bar.g
0.0032 m³/sec
P3, f=0.0128
P4, f=0.0096
P7, f=0.0154
N7, 17.0m
0.0 bar.g@ 0.0m
0.0000 bar.g
N3 8.0m
3.8758 bar.g
P5, f=0.0097
P6, f=0.0057
N5 10.0m
1.8915 bar.g
P2, f=0.0226
N6 8.0m
3.5212 bar.g
0.0040 m³/sec
P1, f=0.0226
N2 0.0m
4.8372 bar.g
N1, 0.0m
0.0 bar.g@ 3.0m
0.2936 bar.g

Fluid Data

Zone	Fluid Name	Chemical Formula	Temperature °C	Pressure bar.g	Density kg/m³	Centistokes	Centipoise	Vapour Pressure bar.a	State
1	Water	H2O	20.000	0.0000	998.000000	1.000000	1.002000	0.024000	Liquid

Pump Data

Pipe Id	Pipe Name	Pump Name	Speed rpm	Pref. Op From m³/sec	Pref. Op To m³/sec	Flow In/Out m³/sec	Velocity m/sec	Suction Pressure bar.g	Discharge Pressure bar.g	Pump Head (+) m.hd Fluid	Pump NPSHr m.hd (absolute)	Pump NPSHa m.hd (absolute)	Pump Efficiency Percentage	Pump Power Kilowatts
1	P1	Pump	2950	0.0126	0.0234	0.0226	2.747	0.2748	4.9367	47.633	4.698	12.915	61.70	17.0483

Pump Data

Name:	Pump
Catalog:	General
Manufacturer:	Generic
Type:	End suction
Size:	3x2-10 A60
Stages:	0
Speed:	2950 Rpm
Impeller Diam:	8.250 inch
Min Speed:	1500 Rpm
Max Speed:	2950 Rpm
Min Diam:	6.000 inch
Max Diam:	10.000 inch

Fluid Data

Fluid:	Water
Density:	998.000000 kg/m³
Viscosity:	1.0020 cP
Temperature:	20.000 °C
Vapor Pressure:	0.0240 bar.a
Atm Pressure:	1.0132 bar.a

Design Curve

Shutoff Head:	63.851 m.hd Fluid
Shutoff dP:	6.2491 bar.g
BEP:	64.0% @ 0.0180 m³/sec
Power at BEP:	15.08 kW
NPSHr at BEP:	3.276 m.hd Fluid
Max Flow Power:	17.74 kW @ 0.0266 m³/sec

Operating Notes

Pref. Op. Region: 70% - 130% of BEP

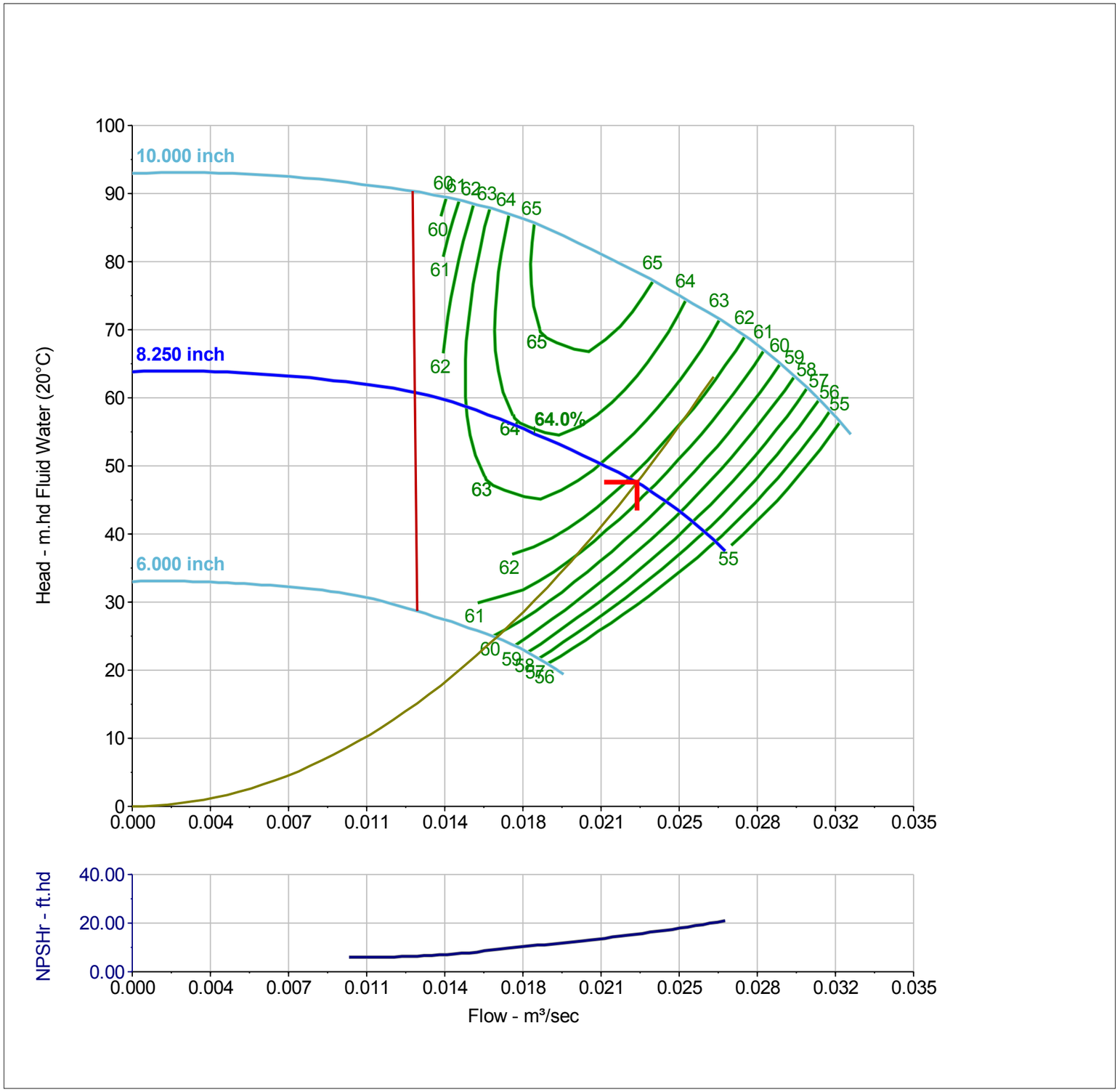
Pref. Flow Range: 0.0126 - 0.0234 m³/sec

Notes:
This pump performance is generally similar to certain ranges from these pump manufactures: Ansi Pro AP96, Goulds 3196, Peerless 8196, Griswold 811, Summit 2196 & Durco Mark III Series ANSI pumps

Data Point

Flow:	0.0226 m³/sec
Head:	47.633 m.hd Fluid
Efficiency:	61.70%
Power:	17.05 kW
NPSHr:	4.698 m.hd Fluid

Pump graph is shown on next page (when document is in landscape format).


10.000 inch
8.250 inch
6.000 inch
64.0%
Head - m.hd Fluid Water (20°C)
NPSHr - ft.hd
Flow - m³/sec
0.000
0.004
0.007
0.011
0.014
0.018
0.021
0.025
0.028
0.032
0.035

Pipe Data

Pipe Id	Pipe Name and Notes	Inner Diameter mm	Length inch	Mass Flow kg/sec	Vol Flow m³/sec	Velocity m/sec	dP Total Loss bar	Entry Pressure bar.g	Exit Pressure bar.g
1	P1	102.260	590.551	22.5177	0.0226	2.747	-4.5436	0.2936	4.8372
2	P2	102.260	944.882	22.5177	0.0226	2.747	0.9614	4.8372	3.8758
3	P3	77.927	3149.606	12.7873	0.0128	2.686	0.7226	3.8758	3.1532
4	P4	77.927	8110.236	9.5937	0.0096	2.016	1.2618	3.1532	1.8915
5	P5	90.119	5314.961	9.7304	0.0097	1.529	0.3546	3.8758	3.5212
6	P6	52.502	3937.008	5.7384	0.0057	2.656	1.6297	3.5212	1.8915
7	P7	62.713	590.551	15.3321	0.0154	4.974	1.8915	1.8915	0.0000

Pipe Fittings

Pipe Id	Pipe	Fitting Position	Description	Imperial Size	Metric Size	Database Ref	K Value	Quantity	K Total	Entry K Total	Exit K Total
1	P1	Start of Pipe	Pipe Entry Sharp	4"	100 mm	EntSharp	0.5000	1	0.5000		
										0.5000	0.0000
2	P2	Start of Pipe	Standard Bend	4"	100 mm	SB	0.5100	1	0.5100		
										0.5100	0.0000
3	P3	Start of Pipe	Through Tee	3"	80 mm	TT	0.3600	1	0.3600		
										0.3600	0.0000
4	P4	Start of Pipe	Standard Bend	3"	80 mm	SB	0.5300	1	0.5300		
										0.5300	0.0000
5	P5	Start of Pipe	Branch Tee	3-1/2"	90 mm	BT	1.0500	1	1.0500		
										1.0500	0.0000
6	P6	Start of Pipe	Standard Bend	2"	50 mm	SB	0.5700	1	0.5700		
										0.5700	0.0000
7	P7	Start of Pipe	Branch Tee	2-1/2"	65 mm	BT	1.0800	1	1.0800		
7	P7	Start of Pipe	Through Tee	2-1/2"	65 mm	TT	0.3600	1	0.3600		
7	P7	End of Pipe	Globe Valve Angled	2-1/2"	65 mm	Angle	2.7000	1	2.7000		
7	P7	End of Pipe	Pipe Exit to Container	2-1/2"	65 mm	ExitCon	1.0000	1	1.0000		
										1.4400	3.7000

Components

Pipe Id	Pipe Name	Inner Diameter mm	Comp. Name	Comp. Type	Comp. Value	Flow m³/sec	Mass Flow kg/sec	Comp. Loss m.hd

Flow Control Valves (FCVs)

Pipe Id	Pipe Name	Inner Diameter mm	FCV Name	FCV Mass Flow kg/sec	FCV Vol Flow m³/sec	FCV Loss m.hd

Pressure Reducing Valves (PRVs)

Pipe Id	Pipe Name	Inner Diameter mm	PRV Name	PRV Pressure bar.g	PRV Loss m.hd

Back Pressure Valves (BPVs)

Pipe Id	Pipe Name	Inner Diameter mm	BPV Name	BPV Pressure bar.g	BPV Loss m.hd

Node Data

Node Id	Node Type	Node	Elevation m	Liquid Level m	Surface Press. bar.g	Press. at Node bar.g	HGL at Node m.hd Fluid	Demand In (Mass) kg/sec	Demand Out (Mass) kg/sec	Demand In (Vol) @ Fluid Zone Density Downstream m³/sec	Demand Out (Vol) @ Fluid Zone Density Downstrem m³/sec
1	Tank	N1	0.000	3.000	0.0000	0.2936	3.000	N/A	N/A	N/A	N/A
2	Join Point	N2	0.000	N/A	N/A	4.8372	49.424	0.0000	0.0000	0.0000	0.0000
3	Join Point	N3	8.000	N/A	N/A	3.8758	47.601	0.0000	0.0000	0.0000	0.0000
4	Join Point	N4	8.000	N/A	N/A	3.1532	40.218	0.0000	3.1936	0.0000	0.0032
5	Join Point	N5	10.000	N/A	N/A	1.8915	29.326	0.0000	0.0000	0.0000	0.0000
6	Join Point	N6	8.000	N/A	N/A	3.5212	43.978	0.0000	3.9920	0.0000	0.0040
7	Tank	N7	17.000	0.000	0.0000	0.0000	17.000	N/A	N/A	N/A	N/A

Energy Data

Pipe Id	Pipe Name	Energy Loss To Pipe Friction	Energy Loss To Pipe Fittings	Energy Loss To Pipe Components	Energy Loss To Pipe Control Valves	Energy Loss To Pump Inefficiency	SUBTOTAL Loss Pipe Items +Pump	Energy Loss To Discharge Pressure	Energy Loss To Change in Elevation	TOTAL USED Sum of All Items
		Kilowatts	Kilowatts	Kilowatts	Kilowatts	Kilowatts	Kilowatts	Kilowatts	Kilowatts	Kilowatts
1	P1	0.224494	0.042486	0.000000	0.000000	6.529750	6.796730	0.000000	0.000000	6.796730
2	P2	0.359191	0.043336	0.000000	0.000000	N/A	0.402527	0.000000	1.766588	2.169115
3	P3	0.909222	0.016612	0.000000	0.000000	N/A	0.925834	0.000000	0.000000	0.925834
4	P4	1.014437	0.010328	0.000000	0.000000	N/A	1.024765	0.000000	0.188165	1.212930
5	P5	0.333793	0.011936	0.000000	0.000000	N/A	0.345728	0.000000	0.000000	0.345728
6	P6	0.812998	0.011536	0.000000	0.000000	N/A	0.824534	0.000000	0.112549	0.937083
7	P7	0.878642	0.974696	0.000000	0.000000	N/A	1.853338	0.000000	1.052498	2.905836