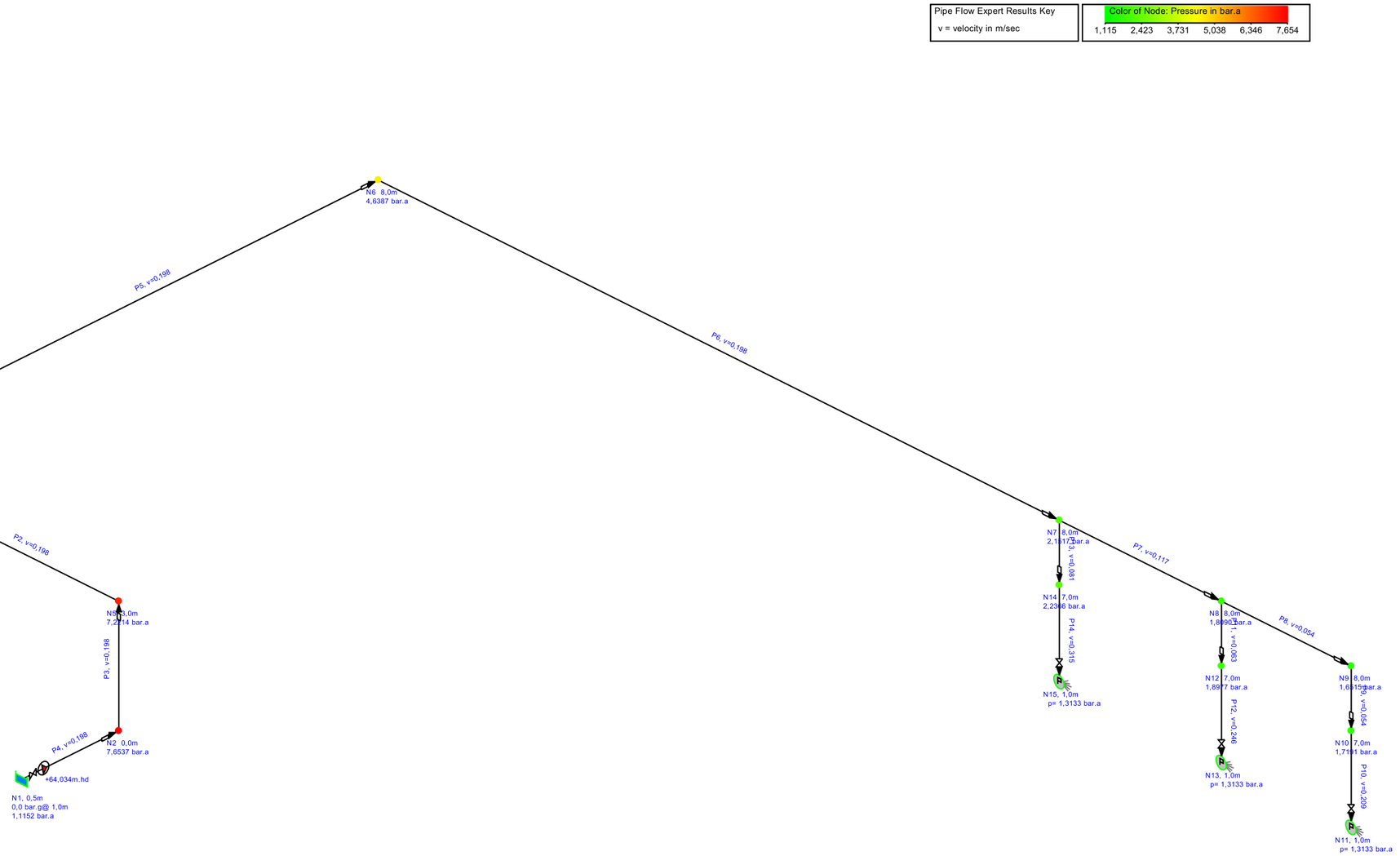
Pipe Flow Design 1

Results Data


Pipe Flow Expert Results Key
v = velocity in m/sec
Color of Node: Pressure in bar.a
1,115 2,423 3,731 5,038 6,346 7,654
N6 8,0m
4,6387 bar.a
P5, v=0,198
P6, v=0,198
N4 3,0m
5,8723 bar.a
P1, v=0,198
N3 3,0m
6,5996 bar.a
P2, v=0,198
N5 3,0m
7,2714 bar.a
P3, v=0,198
P4, v=0,198
N2 0,0m
7,6537 bar.a
+64,034m.hd
N1, 0,5m
0,0 bar.g@ 1,0m
1,1152 bar.a
N7 8,0m
2,1117 bar.a
P13, v=0,081
N14 7,0m
2,2366 bar.a
P14, v=0,315
N15, 1,0m
p= 1,3133 bar.a
P7, v=0,117
N8 8,0m
1,8903 bar.a
P11, v=0,063
N12 7,0m
1,8977 bar.a
P12, v=0,246
N13, 1,0m
p= 1,3133 bar.a
P8, v=0,054
N9 8,0m
1,6515 bar.a
P9, v=0,054
N10 7,0m
1,7191 bar.a
P10, v=0,200
N11, 1,0m
p= 1,3133 bar.a

Fluid Data

Zone	Fluid Name	Chemical Formula	Temperature °C	Pressure bar.a	Density kg/m³	Centistokes	Centipoise	Vapour Pressure bar.a	State
1	Novabond		20,000	1,0132	1040,000000	1730,769231	1800,000000	0,022700	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.a	Discharge Pressure bar.a	Pump Head (+) m.hd Fluid	Pump NPSHr m.hd (absolute)	Pump NPSHa m.hd (absolute)	Pump Efficiency Percentage	Pump Power Kilowatts
4	P4	Pump	2950	0,0089	0,0165	0,0004	0,198	1,1135	7,6443	64,034	0,204	10,695	16,62	1,6874

Pump Data

Name:	Pump
Catalog:	General
Manufacturer:	Generic
Type:	End suction
Size:	3x1-1/2-10 A50
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:	Novabond
Density:	1040,000000 kg/m³
Viscosity:	1800,0000 cP
Temperature:	20,000 °C
Vapor Pressure:	0,0227 bar.a
Atm Pressure:	1,0132 bar.a

Design Curve

Shutoff Head:	63,952 m.hd Fluid
Shutoff dP:	7,5356 bar.a
BEP:	61,3% @ 0,0127 m³/sec
Power at BEP:	11,35 kW
NPSHr at BEP:	2,146 m.hd Fluid
Max Flow Power:	13,62 kW @ 0,0162 m³/sec

Operating Notes

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

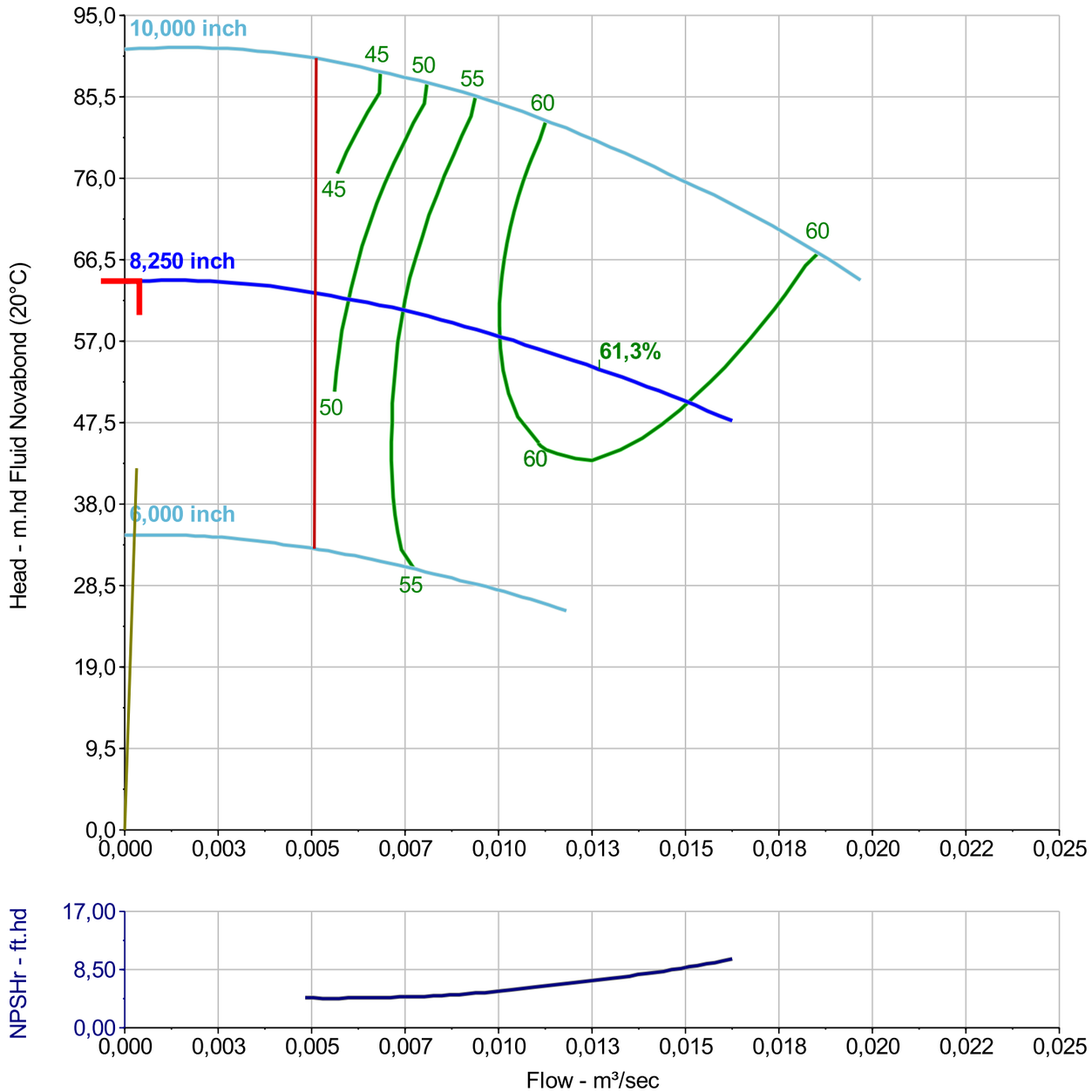
Pref. Flow Range:0,0089 - 0,0165 m³/sec

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:	0,0004 m³/sec
Head:	64,034 m.hd Fluid
Efficiency:	16,62%
Power:	1,69 kW
NPSHr:	0,204 m.hd Fluid

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


95,0
85,5
76,0
66,5
57,0
47,5
38,0
28,5
19,0
9,5
0,0
Head - m.hd Fluid Novabond (20°C)
10,000 inch
8,250 inch
6,000 inch
45
50
55
60
61,3%
0,000
0,003
0,005
0,007
0,010
0,013
0,015
0,018
0,020
0,022
0,025
17,00
8,50
0,00
NPSHr - ft.hd
Flow - m³/sec

Pipe Data

Pipe Id	Pipe Name and Notes	Inner Diameter mm	Length m	Mass Flow kg/sec	Vol Flow m³/sec	Velocity m/sec	Pump Head(+) m.hd	dP Total Loss bar	Entry Pressure bar.a	Exit Pressure bar.a
1	P1	52,502	5,000	0,4466	0,0004	0,198		0,7172	6,5996	5,8823
2	P2	52,502	15,000	0,4466	0,0004	0,198		0,6218	7,2214	6,5996
3	P3	52,502	3,048	0,4466	0,0004	0,198		0,4324	7,6537	7,2214
4	P4	52,502	1,000	0,4466	0,0004	0,198	64,034	-6,5385	1,1152	7,6537
5	P5	52,502	30,000	0,4466	0,0004	0,198		1,2436	5,8823	4,6387
6	P6	52,502	60,000	0,4466	0,0004	0,198		2,4870	4,6387	2,1517
7	P7	52,502	14,000	0,2637	0,0003	0,117		0,3427	2,1517	1,8090
8	P8	52,502	14,000	0,1212	0,0001	0,054		0,1575	1,8090	1,6515
9	P9	52,502	3,048	0,1212	0,0001	0,054		-0,0676	1,6515	1,7191
10	P10	26,645	6,000	0,1212	0,0001	0,209		0,4059	1,7191	1,3133
11	P11	52,502	1,000	0,1425	0,0001	0,063		-0,0887	1,8090	1,8977
12	P12	26,645	6,000	0,1425	0,0001	0,246		0,5845	1,8977	1,3133
13	P13	52,502	1,000	0,1829	0,0002	0,081		-0,0849	2,1517	2,2366
14	P14	26,645	6,000	0,1829	0,0002	0,315		0,9234	2,2366	1,3133

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	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	1	0,3000		
										0,0000	0,3000
2	P2	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	1	0,3000		
										0,0000	0,3000
3	P3	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	1	0,3000		
										0,0000	0,3000
4	P4	Start of Pipe	Wafer Check Valve	2"	50 mm	ChWaf	8,4000	1	8,4000		
4	P4	Start of Pipe	Ball Valve Full Bore	2"	50 mm	BallFB	0,0600	1	0,0600		
4	P4	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	2	0,6000		
										8,4600	0,6000
5	P5	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	3	0,9000		
										0,0000	0,9000
6	P6	End of Pipe	Through Tee	2"	50 mm	TT	0,3800	1	0,3800		
										0,0000	0,3800
7	P7	End of Pipe	Through Tee	2"	50 mm	TT	0,3800	1	0,3800		
										0,0000	0,3800
8	P8	End of Pipe	Long Bend	2"	50 mm	LB	0,3000	1	0,3000		
										0,0000	0,3000
9	P9	End of Pipe	Gradual contraction	N/A	N/A	GrCon	3,2000	1	3,2000		
										0,0000	3,2000
10	P10	End of Pipe	Ball Valve Full Bore	1"	25 mm	BallFB	0,0700	3	0,2100		
10	P10	End of Pipe	Plug Valve Straightway	1"	25 mm	Plug	0,4100	1	0,4100		
										0,0000	0,6200
11	P11	End of Pipe	Gradual contraction	N/A	N/A	GrCon	3,2000	1	3,2000		
										0,0000	3,2000

Pipe Id	Pipe	Fitting Position	Description	Imperial Size	Metric Size	Database Ref	K Value	Quantity	K Total	Entry K Total	Exit K Total
12	P12	End of Pipe	Ball Valve Full Bore	1"	25 mm	BallFB	0,0700	3	0,2100		
12	P12	End of Pipe	Plug Valve Straightway	1"	25 mm	Plug	0,4100	1	0,4100		
										0,0000	0,6200
13	P13	End of Pipe	Gradual contraction	N/A	N/A	GrCon	3,2000	1	3,2000		
										0,0000	3,2000
14	P14	End of Pipe	Ball Valve Full Bore	1"	25 mm	BallFB	0,0700	3	0,2100		
14	P14	End of Pipe	Plug Valve Straightway	1"	25 mm	Plug	0,4100	1	0,4100		
										0,0000	0,6200

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.a	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	0,500	1,000	0,0000	1,1152	1,500	N/A	N/A	N/A	N/A
2	Join Point	N2	0,000	N/A	N/A	7,6537	65,110	0,0000	0,0000	0,0000	0,0000
3	Join Point	N3	3,000	N/A	N/A	6,5996	57,774	0,0000	0,0000	0,0000	0,0000
4	Join Point	N4	8,000	N/A	N/A	5,8823	55,741	0,0000	0,0000	0,0000	0,0000
5	Join Point	N5	3,000	N/A	N/A	7,2214	63,870	0,0000	0,0000	0,0000	0,0000
6	Join Point	N6	8,000	N/A	N/A	4,6387	43,547	0,0000	0,0000	0,0000	0,0000
7	Join Point	N7	8,000	N/A	N/A	2,1517	19,163	0,0000	0,0000	0,0000	0,0000
8	Join Point	N8	8,000	N/A	N/A	1,8090	15,802	0,0000	0,0000	0,0000	0,0000
9	Join Point	N9	8,000	N/A	N/A	1,6515	14,258	0,0000	0,0000	0,0000	0,0000
10	Join Point	N10	7,000	N/A	N/A	1,7191	13,921	0,0000	0,0000	0,0000	0,0000
11	Demand Pressure	N11	1,000	N/A	0,3000	1,3133	3,941	N/A	N/A	N/A	N/A
12	Join Point	N12	7,000	N/A	N/A	1,8977	15,672	0,0000	0,0000	0,0000	0,0000
13	Demand Pressure	N13	1,000	N/A	0,3000	1,3133	3,941	N/A	N/A	N/A	N/A
14	Join Point	N14	7,000	N/A	N/A	2,2366	18,995	0,0000	0,0000	0,0000	0,0000
15	Demand Pressure	N15	1,000	N/A	0,3000	1,3133	3,941	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	0,008899	0,000003	0,000000	0,000000	N/A	0,008902	0,000000	0,021898	0,030800
2	P2	0,026698	0,000003	0,000000	0,000000	N/A	0,026700	0,000000	0,000000	0,026700
3	P3	0,005425	0,000003	0,000000	0,000000	N/A	0,005428	0,000000	0,013139	0,018566
4	P4	0,001780	0,000080	0,000000	0,000000	1,406972	1,408832	0,000000	-0,002190	1,406642
5	P5	0,053396	0,000008	0,000000	0,000000	N/A	0,053404	0,000000	0,000000	0,053404
6	P6	0,106791	0,000003	0,000000	0,000000	N/A	0,106795	0,000000	0,000000	0,106795
7	P7	0,008690	0,000001	0,000000	0,000000	N/A	0,008691	0,000000	0,000000	0,008691
8	P8	0,001836	0,000000	0,000000	0,000000	N/A	0,001836	0,000000	0,000000	0,001836
9	P9	0,000400	0,000001	0,000000	0,000000	N/A	0,000400	0,000000	-0,001189	-0,000789
10	P10	0,011863	0,000002	0,000000	0,000000	N/A	0,011865	0,003497	-0,007133	0,008228
11	P11	0,000181	0,000001	0,000000	0,000000	N/A	0,000182	0,000000	-0,001397	-0,001215
12	P12	0,016390	0,000003	0,000000	0,000000	N/A	0,016393	0,004111	-0,008385	0,012119
13	P13	0,000298	0,000002	0,000000	0,000000	N/A	0,000300	0,000000	-0,001793	-0,001493
14	P14	0,026989	0,000006	0,000000	0,000000	N/A	0,026995	0,005275	-0,010759	0,021510