

FORMULAS

$$\text{Motor BHP (output)} = \frac{\text{Input HP} \times \text{Motor Eff.(\%)}}{100}$$

Where K = Meter constant = watts per revolution of revolving disc (value of K is marked on the meter nameplate or on the revolving disc). Where current transformers are used, multiply meter constant by current transformer ratio.

R = Number of disc revolutions counted.

t = Time in seconds for R revolutions.

CALCULATING OPERATING COSTS OF PUMPS: Costs in Cents per 1,000 Gallons:

$$\text{Cost (¢)} = \frac{\text{kw Input} \times r \times 1,000}{\text{GPH}}$$

Cost in Cents per Acre-Inch

$$\text{Cost (¢)} = \frac{\text{kw Input} \times r \times 452.6}{\text{GPM}}$$

Where: r = cost of power in cents per kw-hr.

FRICTION LOSS TABLES

Friction Loss Table – SCH 40 STEEL PIPE

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

GPM	GPH	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
		ID	ID	ID	ID	ID	ID	ID	ID	ID
2	120	4.8								
3	180	10								
4	240	17.1								
5	300	25.8	6.3	1.9						
6	360	36.5	8.9	2.7						
7	420	48.7	11.8	3.6						
8	480	62.7	15	4.5						
9	540	78.3	18.8	5.7						
10	600	95.9	23	6.9	1.8					
12	720		32.6	9.6	2.5	1.2				
14	840		43.5	12.8	3.3	1.5				
16	960		56.3	16.5	4.2	2				
20	1,200		86.1	25.1	6.3	2.9				
25	1,500			38.7	9.6	4.5	1.3			
30	1,800			54.6	13.6	6.3	1.8			
35	2,100			73.3	18.2	8.4	2.4			
40	2,400			95	23.5	10.8	3.1	1.3		
45	2,700				29.4	13.5	3.9	1.6		
50	3,000				36	16.4	4.7	1.9		
60	3,600				51	23.2	6.6	2.7		
70	4,200				68.8	31.3	8.9	3.6	1.2	
80	4,800				89.2	40.5	11.4	4.6	1.6	
90	5,400					51	14.2	5.8	2	
100	6,000					62.2	17.4	7.1	2.4	
120	7,200						24.7	10.1	3.4	1.2
140	8,400						33.2	13.5	4.5	1.5
160	9,600						43	17.5	5.8	1.5
200	12,000						66.3	27	8.9	2.3
260	15,600							45	14.8	3.7
300	18,000							59.6	19.5	4.9

Friction Loss Table – SCH 40 PVC

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

GPM	GPH	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
		ID	ID	ID	ID	ID	ID	ID	ID	ID
2	120	4.1								
3	180	8.7	2.2							
4	240	14.8	3.7							
5	300	22.2	5.7	1.8						
6	360	31.2	8	2.5						
7	420	41.5	10.6	3.3						
8	480	53	13.5	4.2						
9	540	66	16.8	5.2						
10	600	80.5	20.4	6.3	1.7					
12	720		28.6	8.9	2.3	1.1				
14	840		38	11.8	3.1	1.4				
16	960		48.6	15.1	4	1.9				
20	1,200		60.5	22.8	6	2.8				
25	1,500			38.7	9.1	4.3	1.3			
30	1,800				12.7	6	1.8			
35	2,100				16.9	8	2.4			
40	2,400				21.6	10.2	3	1.1		
45	2,700				28	12.5	3.8	1.4		
50	3,000					15.4	4.6	1.7		
60	3,600					21.6	6.4	2.3		
70	4,200					28.7	8.5	3	1.2	
80	4,800					36.8	10.9	3.8	1.4	
90	5,400					45.7	13.6	4.8	1.8	
100	6,000					56.6	16.5	5.7	2.2	
120	7,200						23.1	8	3	1.1
140	8,400						30.6	10.5	4	1.4
160	9,600						39.3	13.4	5	1.4
200	12,000						66.3	20.1	7.6	2.1
260	15,600							32.4	12.2	3.4
300	18,000							42.1	15.8	4.4

Friction Loss Table – VALVES and FITTINGS

(Friction Loss in Equivalent Number of Feet of Straight Pipe)

TYPE OF FITTING AND APPLICATION	PIPE AND FITTING	NOMINAL SIZE OF FITTING AND PIPE							
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	
		EQUIVALENT LENGTH OF PIPE (IN FEET)							
Insert Coupling	Plastic	3	3	3	3	3	3	3	
Threaded Adapter (Plastic to Thread)	Plastic	3	3	3	3	3	3	3	
90° Standard Elbow	Steel	2	2	3	4	4	5	6	
	Plastic	2	2	3	4	4	5	6	
Standard Tee (Flow Through Run)	Steel	1	2	2	3	3	4	4	
	Plastic	1	2	2	3	3	4	4	
Standard Tee (Flow Through Side)	Steel	4	5	6	7	8	11	13	
	Plastic	4	5	6	7	8	11	13	
Gate Valve ¹	Steel	1	1	1	1	2	2	2	
Swing Check Valve ¹	Steel	5	7	9	12	13	17	21	

NOTES:

Based on schedule 40 steel and plastic fittings.

Figures given are friction losses in terms of Equivalent Lengths of straight pipe.

① Friction loss figures are for screwed valves and are based on equivalent lengths of steel pipe.