



AQUASYSTEM PP-R Pipe Sizing

Determining the required pipe diameter of AQUASYSTEM fibre pipe

The following formula can be used as an approximation for a given flow rate:

$$d_i = 35.7 \sqrt{\frac{Q}{v}}$$

Where v = flow velocity (m/s)
 d_i = inside diameter of pipe (mm)
 Q = flow rate (l/s)

The following values are generally accepted design velocities for water-like media:
 Delivery system, $v = 1.0 - 3.0$ m/s
 Suction system, $v = 0.5 - 1.0$ m/s

AQUASYSTEM fibre pipe sizes

Pipe Outside diameter (mm)	Wall thickness diameter (mm)	Pipe Inside diameter (mm)
20	2.8	14.4
25	3.5	18.0
32	3.6	24.8
40	4.5	31.0
50	5.6	38.8
63	7.1	48.8
75	8.4	58.2
90	10.1	69.8
110	12.3	85.4
125	14.0	97.0

AQUASYSTEM PP-R Pressure Losses

Pressure loss in AQUASYSTEM fibre pipe

The pressure losses in a straight length of AQUASYSTEM fibre pipe can be calculated using the following formula:

$$\Delta p_R = \lambda \cdot \frac{L}{d_i} \cdot \frac{\rho}{2 \cdot 10^2} \cdot v^2$$

Where Δp_R = pressure loss in a straight length of pipe (bar)
 λ = pipe friction factor; for smooth plastic pipe and turbulent flow, $\lambda = 0.02$.
 L = length of straight length of pipe (m)
 d_i = inside diameter of pipe (mm)
 ρ = density of transported media (kg/m³) [1 g/cm³ = 1000 kg/m³]
 v = flow velocity (m/s)

The following chart can be used to determine the pressure loss and flow velocities in AQUASYSTEM fibre pipe.

Calculated flow velocity, v (m/s) and pressure loss, p (mbar/m) in AQUASYSTEM fibre pipe at a given flow rate, Q .

Q l/s	Q l/m	Pipe Outside Diameter (mm)	Pipe Outside Diameter										
			20	25	32	40	50	63	75	90	110	125	
0.05	3.0	p	0.65	0.21	0.04								
		v	0.31	0.20	0.10								
0.06	3.6	p	0.94	0.31	0.06								
		v	0.37	0.24	0.12								
0.07	4.2	p	1.28	0.42	0.08								
		v	0.43	0.28	0.14								
0.08	4.8	p	1.68	0.55	0.11	0.04							
		v	0.49	0.31	0.17	0.11							
0.09	5.4	p	2.12	0.69	0.14	0.05							
		v	0.55	0.35	0.19	0.12							
0.10	6.0	p	2.62	0.86	0.17	0.06							
		v	0.61	0.39	0.21	0.13							
0.12	7.2	p	3.77	1.24	0.25	0.08	0.03						
		v	0.74	0.47	0.25	0.16	0.10						
0.14	8.4	p	5.13	1.68	0.34	0.11	0.04						
		v	0.86	0.55	0.29	0.19	0.12						
0.16	9.6	p	6.70	2.20	0.44	0.14	0.05						
		v	0.98	0.63	0.33	0.21	0.14						
0.18	10.8	p	8.48	2.78	0.56	0.18	0.06	0.02					
		v	1.11	0.71	0.37	0.24	0.15	0.10					
0.20	12.0	p	10.47	3.43	0.69	0.23	0.07	0.02					
		v	1.23	0.79	0.41	0.26	0.17	0.11					
0.30	18.0	p	23.56	7.72	1.56	0.51	0.17	0.05	0.02				
		v	1.84	1.18	0.62	0.40	0.25	0.16	0.11				
0.40	24.0	p	41.89	13.73	2.76	0.91	0.29	0.09	0.04	0.02			
		v	2.46	1.57	0.83	0.53	0.34	0.21	0.15	0.10			
0.50	30.0	p	65.46	21.45	4.32	1.42	0.46	0.15	0.06	0.02			
		v	3.07	1.96	1.04	0.66	0.42	0.27	0.19	0.13			
0.60	36.0	p	94.26	30.89	6.22	2.04	0.66	0.21	0.09	0.04	0.01		
		v	3.68	2.36	1.24	0.79	0.51	0.32	0.23	0.16	0.10		
0.70	42.0	p	128.29	42.04	8.47	2.77	0.90	0.29	0.12	0.05	0.02		
		v	4.30	2.75	1.45	0.93	0.59	0.37	0.26	0.18	0.12		
0.80	48.0	p	167.57	54.91	11.06	3.62	1.18	0.37	0.16	0.06	0.02	0.01	
		v	4.91	3.14	1.66	1.06	0.68	0.43	0.30	0.21	0.14	0.11	
0.90	54.0	p		69.49	14.00	4.59	1.49	0.47	0.20	0.08	0.03	0.02	
		v		3.54	1.86	1.19	0.76	0.48	0.34	0.24	0.16	0.12	
1.00	60.0	p		85.79	17.28	5.66	1.84	0.59	0.24	0.10	0.04	0.02	
		v		3.93	2.07	1.32	0.85	0.53	0.38	0.26	0.17	0.14	
1.20	72.0	p		123.54	24.88	8.15	2.65	0.84	0.35	0.14	0.05	0.03	
		v		4.72	2.48	1.59	1.01	0.64	0.45	0.31	0.21	0.16	
1.40	84.0	p			33.87	11.10	3.61	1.15	0.48	0.19	0.07	0.04	
		v			2.90	1.85	1.18	0.75	0.53	0.37	0.24	0.19	
1.60	96.0	p			44.24	14.50	4.72	1.50	0.62	0.25	0.09	0.05	
		v			3.31	2.12	1.35	0.86	0.60	0.42	0.28	0.22	
1.80	108.0	p			55.99	18.35	5.97	1.90	0.79	0.32	0.12	0.06	
		v			3.73	2.38	1.52	0.96	0.68	0.47	0.31	0.24	
2.00	120	p			69.12	22.65	7.37	2.34	0.97	0.39	0.14	0.08	
		v			4.14	2.65	1.69	1.07	0.75	0.52	0.35	0.27	
2.20	132	p			83.64	27.41	8.92	2.84	1.18	0.47	0.17	0.09	
		v			4.55	2.91	1.86	1.18	0.83	0.57	0.38	0.30	
2.40	144	p			99.54	32.62	10.62	3.37	1.40	0.56	0.21	0.11	
		v			4.97	3.18	2.03	1.28	0.90	0.63	0.42	0.32	
2.60	156	p				38.28	12.46	3.96	1.64	0.66	0.24	0.13	
		v				3.44	2.20	1.39	0.98	0.68	0.45	0.35	
2.80	168	p				44.39	14.45	4.59	1.90	0.77	0.28	0.15	
		v				3.71	2.37	1.50	1.05	0.73	0.49	0.38	
3.00	180	p				50.96	16.59	5.27	2.18	0.88	0.32	0.17	
		v				3.97	2.54	1.60	1.13	0.78	0.52	0.41	
3.20	192	p				57.98	18.88	6.00	2.49	1.00	0.37	0.19	
		v				4.24	2.71	1.71	1.20	0.84	0.56	0.43	
3.40	204	p				65.46	21.31	6.77	2.81	1.13	0.41	0.22	
		v				4.50	2.88	1.82	1.28	0.89	0.59	0.46	
3.60	216	p				73.39	23.89	7.59	3.15	1.27	0.46	0.24	
		v				4.77	3.04	1.92	1.35	0.94	0.63	0.49	

Q l/s	Q l/m	Pipe Outside Diameter (mm)	Pipe Outside Diameter									
			20	25	32	40	50	63	75	90	110	125
3.80	228	p					26.62	8.46	3.51	1.41	0.52	0.27
		v					3.21	2.03	1.43	0.99	0.66	0.51
4.00	240	p					29.50	9.37	3.88	1.57	0.57	0.30
		v					3.38	2.14	1.50	1.05	0.70	0.54
4.20	252	p					32.52	10.33	4.28	1.73	0.63	0.33
		v					3.55	2.25	1.58	1.10	0.73	0.57
4.40	264	p					35.69	11.34	4.70	1.89	0.69	0.37
		v					3.72	2.35	1.65	1.15	0.77	0.60
4.60	276	p					39.01	12.39	5.14	2.07	0.76	0.40
		v					3.89	2.46	1.73	1.20	0.80	0.62
4.80	288	p					42.48	13.50	5.59	2.25	0.82	0.43
		v					4.06	2.57	1.80	1.25	0.84	0.65
5.00	300	p					46.09	14.64	6.07	2.45	0.89	0.47
		v					4.23	2.67	1.88	1.31	0.87	0.68
5.20	312	p					49.85	15.84	6.56	2.65	0.97	0.51
		v					4.40	2.78	1.95	1.36	0.91	0.70
5.40	324	p					53.76	17.08	7.08	2.85	1.04	0.55
		v					4.57	2.89	2.03	1.41	0.94	0.73
5.60	336	p					57.81	18.37	7.61	3.07	1.12	0.59
		v					4.74	2.99	2.11	1.46	0.98	0.76
5.80	348	p					62.02	19.71	8.17	3.29	1.20	0.64
		v					4.91	3.10	2.18	1.52	1.01	0.78
6.00	360	p						21.09	8.74	3.52	1.28	0.68
		v						3.21	2.26	1.57	1.05	0.81
6.20	372	p						22.52	9.33	3.76	1.37	0.73
		v						3.31	2.33	1.62	1.08	0.84
6.40	384	p						23.99	9.94	4.01	1.46	0.77
		v						3.42	2.41	1.67	1.12	0.87
6.60	396	p						25.52	10.58	4.26	1.55	0.82
		v						3.53	2.48	1.72	1.15	0.89
6.80	408	p						27.09	11.23	4.52	1.65	0.87
		v						3.64	2.56	1.78	1.19	0.92
7.00	420	p						28.70	11.90	4.79	1.75	0.93
		v						3.74	2.63	1.83	1.22	0.95
7.20	432	p						30.37	12.59	5.07	1.85	0.98
		v						3.85	2.71	1.88	1.26	0.97
7.40	444	p						32.08	13.29	5.36	1.95	1.03
		v						3.96	2.78	1.93	1.29	1.00
7.60	456	p						33.83	14.02	5.65	2.06	1.09
		v						4.06	2.86	1.99	1.33	1.03
7.80	468	p						35.64	14.77	5.95	2.17	1.15
		v						4.17	2.93	2.04	1.36	1.06
8.00	480	p						37.49	15.54	6.26	2.28	1.21
		v						4.28	3.01	2.09	1.40	1.08
8.20	492	p						39.39	16.32	6.58	2.40	1.27
		v						4.38	3.08	2.14	1.43	1.11
20.00	1200	p									14.28	7.55
		v									3.49	2.71
20.20	1212	p									14.56	7.70
		v									3.53	2.73
20.40	1224	p									14.85	7.86
		v									3.56	2.76
20.60	1236	p									15.14	8.01
		v									3.60	2.79
20.80	1248	p									15.44	8.17
		v									3.63	2.81
21.00	1260	p									15.74	8.33
		v									3.67	2.84
21.20	1272	p									16.04	8.48
		v									3.70	2.87
21.40	1284	p									16.34	8.65
		v									3.74	2.90
21.60	1296	p									16.65	8.81
		v									3.77	2.92
21.80	1308	p									16.96	8.97
		v									3.81	2.95
22.00	1320	p									17.27	9.14
		v									3.84	2.98
22.20	1332	p									17.59	9.30
		v									3.88	3.00
22.40	1344	p									17.91	9.47
		v									3.91	3.03

Q l/s	Q l/m	Pipe Outside Diameter (mm)	Pipe Outside Diameter									
			20	25	32	40	50	63	75	90	110	125
22.60	1356	p									18.23	9.64
		v									3.95	3.06
22.80	1368	p									18.55	9.81
		v									3.98	3.09
23.00	1380	p									18.88	9.99
		v									4.02	3.11
23.20	1392	p									19.21	10.16
		v									4.05	3.14
23.40	1404	p									19.54	10.34
		v									4.09	3.17
23.60	1416	p									19.88	10.51
		v									4.12	3.19
23.80	1428	p									20.22	10.69
		v									4.16	3.22
24.00	1440	p									20.56	10.87
		v									4.19	3.25
24.20	1452	p									20.90	11.06
		v									4.22	3.27
24.40	1464	p									21.25	11.24
		v									4.26	3.30
24.60	1476	p									21.60	11.42
		v									4.29	3.33
24.80	1488	p									21.95	11.61
		v									4.33	3.36
25.00	1500	p									22.31	11.80
		v									4.36	3.38
25.20	1512	p									22.66	11.99
		v									4.40	3.41
25.40	1524	p									23.02	12.18
		v									4.43	3.44
25.60	1536	p									23.39	12.37
		v									4.47	3.46
25.80	1548	p									23.76	12.57
		v									4.50	3.49
26.00	1560	p									24.13	12.76
		v									4.54	3.52
26.20	1572	p									24.50	12.96
		v									4.57	3.55
26.40	1584	p									24.87	13.16
		v									4.61	3.57
26.60	1596	p									25.25	13.36
		v									4.64	3.60
26.80	1608	p									25.63	13.56
		v									4.68	3.63
27.00	1620	p									26.02	13.76
		v									4.71	3.65
27.20	1632	p									26.40	13.97
		v									4.75	3.68
27.40	1644	p									26.79	14.17
		v									4.78	3.71
27.60	1656	p									27.19	14.38
		v									4.82	3.73
27.80	1668	p									27.58	14.59
		v									4.85	3.76
28.00	1680	p									27.98	14.80
		v									4.89	3.79
28.20	1692	p									28.38	15.01
		v									4.92	3.82
28.40	1704	p									28.79	15.23
		v									4.96	3.84
28.60	1716	p									29.19	15.44
		v									4.99	3.87
28.80	1728	p									15.66	
		v										3.90
29.00	1740	p									15.88	
		v										3.92
29.20	1752	p									16.10	
		v										3.95
29.40	1764	p									16.32	
		v										3.98
29.60	1776	p									16.54	
		v										4.01

Q l/s	Q l/m	Pipe Outside Diameter (mm)	Pipe Outside Diameter (mm)										
			20	25	32	40	50	63	75	90	110	125	
29.80	1788	p											16.76
		v											4.03
30.00	1800	p											16.99
		v											4.06
30.20	1812	p											17.22
		v											4.09
30.40	1824	p											17.45
		v											4.11
30.60	1836	p											17.68
		v											4.14
30.80	1848	p											17.91
		v											4.17
31.00	1860	p											18.14
		v											4.19
31.20	1872	p											18.38
		v											4.22
31.40	1884	p											18.61
		v											4.25
31.60	1896	p											18.85
		v											4.28
31.80	1908	p											19.09
		v											4.30
32.00	1920	p											19.33
		v											4.33
32.20	1932	p											19.57
		v											4.36
32.40	1944	p											19.82
		v											4.38
32.60	1956	p											20.06
		v											4.41
32.80	1968	p											20.31
		v											4.44
33.00	1980	p											20.56
		v											4.47
33.20	1992	p											20.81
		v											4.49
33.40	2004	p											21.06
		v											4.52
33.60	2016	p											21.31
		v											4.55
33.80	2028	p											21.57
		v											4.57
34.00	2040	p											21.82
		v											4.60
34.20	2052	p											22.08
		v											4.63
34.40	2064	p											22.34
		v											4.66
34.60	2076	p											22.60
		v											4.68
34.80	2088	p											22.86
		v											4.71
35.00	2100	p											23.13
		v											4.74
35.20	2112	p											23.39
		v											4.76
35.40	2124	p											23.66
		v											4.79
35.60	2136	p											23.93
		v											4.82
35.80	2148	p											24.20
		v											4.84
36.00	2160	p											24.47
		v											4.87
36.20	2172	p											24.74
		v											4.90
36.40	2184	p											25.01
		v											4.93
36.60	2196	p											25.29
		v											4.95
36.80	2208	p											25.57
		v											4.98