

# Onsite Wastewater Treatment Systems Training Program

## Effluent Distribution Systems

### Module 109A—Friction Loss Tables

The Onsite Wastewater Treatment Systems Training Program was developed through a partnership between Alberta Municipal Affairs and the Alberta Onsite Wastewater Management Association.

It has been adapted to the BC regulatory framework for delivery through WCOWMA Onsite Wastewater Management Association of BC.



Western Canada Onsite Wastewater  
Management Association



**Table II- 15. For uniform distribution with demand dosing to native soil or native soil plus less than 30 cm sand fill**

SOIL TYPE	TYPE OF DOSING	EFFLUENT TYPE (HLR)	MINIMUM VS IN NATIVE SOIL	MINIMUM AS CONSTRUCTED VS
<ul style="list-style-type: none"> <li>○ Gravelly Sand, Coarse Sand, Loamy Coarse Sand, Sand and Loamy Sand</li> <li>○ <b>Or</b> Kfs from 1,500 to 17,000 mm/day</li> <li>○ <b>Or</b> Perc rate from 0.5 to less than 5 min/inch</li> </ul>	Demand dosing	1 or 3	60 cm	60 cm
		2	60 cm	85 cm
	Low frequency demand dosing	1 or 3	75 cm	75 cm
		2	90 cm	90 cm
Other soils	Demand dosing	All types	60 cm	60 cm
	Low frequency demand dosing	All types	70 cm	70 cm

**Table II- 16. For uniform distribution with timed or micro-dosing to native soil or native soil plus less than 30 cm sand fill**

SOIL TYPE	TYPE OF DOSING	EFFLUENT TYPE (HLR)	MINIMUM VS IN NATIVE SOIL	MINIMUM AS CONSTRUCTED VS
<ul style="list-style-type: none"> <li>○ Very or Extremely Gravelly Sand or Coarse Sand</li> <li>○ <b>Or</b> Kfs greater than 17,000 mm/day</li> <li>○ <b>Or</b> Perc rate faster than 0.5 min/inch</li> </ul>	Timed dosing	All types	60 cm	85 cm
	Micro-dosing	All types	45 cm	75 cm
<ul style="list-style-type: none"> <li>○ Gravelly Sand, Coarse Sand, Loamy Coarse Sand, Sand and Loamy Sand</li> <li>○ <b>Or</b> Kfs from 1,500 to 17,000 mm/day</li> <li>○ <b>Or</b> Perc rate from 0.5 to less than 5 min/inch</li> </ul>	Timed dosing	1 or 3	45 cm	60 cm
		2	45 cm	75 cm
	Low frequency Timed dosing	1 or 3	60 cm	75 cm
		2	70 cm	85 cm
	Micro-dosing	All types	45 cm	55 cm
Other soils	Timed dosing	All types	45 cm	60 cm
	Low frequency timed dosing	All types	70 cm	70 cm
	Micro-dosing	All types	45 cm	55 cm

- If the sand media fill is 30 cm or thicker, then follow the sand mound standards, Table II- 17.

**Table II- 17. For sand mounds and sand lined trenches and beds**

SOIL TYPE	TYPE OF DOSING	EFFLUENT TYPE (HLR)	MINIMUM VS IN NATIVE SOIL	MINIMUM SAND MEDIA THICKNESS	MINIMUM AS CONSTRUCTED VS
All soil types	Demand dosing	1	25 cm	60 cm	85 cm
	Timed dosing	1	25 cm	45 cm	75 cm
	Low frequency Timed dosing	1	25 cm	60 cm	85 cm
	Micro-dosing	1 or 3	25 cm	30 cm	60 cm
		2	25 cm	45 cm	75 cm

**Table II- 18. For Subsurface Drip Dispersal (SDD) systems with micro-dosing**

SOIL TYPE	INSTALLED IN	EFFLUENT TYPE (HLR)	MINIMUM VS IN NATIVE SOIL	MINIMUM AS CONSTRUCTED VS
<ul style="list-style-type: none"> <li>○ Very or Extremely Gravelly Sand or Coarse Sand</li> <li>○ <b>Or</b> Kfs greater than 17,000 mm/day</li> <li>○ <b>Or</b> Perc rate faster than 0.5 min/inch</li> </ul>	Native soil	All types	60 cm	/
	Fill material	All types	45 cm	60 cm
Other soils	Native soil	All types	45 cm	/
	Fill material	All types	30 cm	60 cm

### Friction Loss Equivalent Length for Polyethylene Piping Insert Fittings

A-1.C.5 Friction Loss Equivalent Lengths for Polyethylene Piping Insert Fittings						
Expressed in Approximate Length of Straight Pipe						
Pipe Size	Male/Female Pipe Adapters		Couplings and Tee Fittings on the Run		Elbows and Tee Fittings Run to Branch	
	Feet	Metres	Feet	Metres	Feet	Metres
12.8 mm (1/2")	1	0.3	0.5	0.15	3	0.91
19 mm (3/4")	1.5	0.46	0.75	0.23	4.3	1.31
25 mm (1")	2	0.61	1	0.3	6	1.83
32 mm (1 1/4")	2.7	0.82	1.3	0.4	8.6	2.62
38 mm (1 1/2")	3.4	1.04	1.6	0.49	10.5	3.2
63.5 mm (2")	4.4	1.34	2	0.61	13.2	4.02
76.2 mm (3")	6.2	1.89	2.9	0.88	17	5.18

### Friction Loss Equivalent Length for Schedule 40 PVC Pipe—Metric

A.1.C.6. Friction Loss Equivalent Length - PVC Sched 40 in Metric												
Expressed in Approximate Length of Straight Pipe												
Pipe Size mm (inches)	Male/Female Pipe Adapters		Couplings and Tee Fittings on the Run		90 ° Elbows		Tee Fittings Run to Branch		45° Elbows		Gate Valves	
	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
12.8 mm (1/2")	1	.3	1	.3	1.5	.46	4	1.21	.8	.24	.3	.09
19 mm (3/4")	1.5	.46	1.4	.43	2	.61	5	1.57	1.1	.33	.4	.12
25 mm (1")	2	.61	1.7	.51	2.5	.76	6	1.82	1.4	.43	.6	.18
32 mm (1.25")	2.8	.85	2.3	.7	3.8	1.15	7	2.13	1.8	.54	.8	.24
38 mm (1.5")	3.5	1.06	2.7	.82	4	1.21	8	2.44	2.1	.64	1	.3
51 mm (2")	4.5	1.37	4.3	1.31	5.7	1.74	12	3.66	2.6	.79	1.5	.46
63.5 mm (2.5")	5.5	1.67	5.1	1.55	6.9	2.1	15	4.57	3.1	.94	2	.61
76.2mm (3")	6.5	1.98	6.2	1.89	7.9	2.4	16	4.87	4	1.21	3	.91

Table A.. 1.A Number of Orifices in a Distribution Lateral Pipe											
Squirt Height, m	NPS Pipe Size of Distribution Lateral	1/8" (3.2mm)					5/32" (4mm)				
		3/4" 19m m	1" 25m m	1-1/4" 32m m	1-1/2" 38m m	2" 51m m	3/4" 19m m	1" 25m m	1-1/4" 32m m	1-1/2" 38m m	2" 51m m
Distribution Lateral Length, m		Maximum Orifices Permitted					Maximum Orifices Permitted				
.6 to 1.2	3	-	-	-	-	-	-	-	-	-	-
	4.5	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-
	7.6	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-
	10.6	-	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-	-
	13.75	-	-	-	-	-	-	-	-	-	-
	15.25	-	-	-	-	-	-	-	-	-	-
	16.75	-	-	-	-	-	-	-	-	-	-
	18.25	-	-	-	-	-	-	-	-	-	-
19.8	-	-	-	-	-	-	-	-	-	-	
1.5 to 2.75	3	20	20	20	20	20	20	20	20	20	20
	4.5	26	30	30	30	30	17	30	30	30	30
	6	22	40	40	40	40	14	27	40	40	40
	7.6	20	37	50	50	50	13	24	48	50	50
	9	18	33	60	60	60	11	21	44	60	60
	10.6	16	31	70	70	70	11	20	40	60	70
	12	15	29	58	80	80	10	18	37	56	80
	13.75	14	27	55	82	90	9	17	35	53	90
	15.25	14	25	52	78	100	-	16	33	50	96
	16.75	13	24	49	74	110	-	15	32	47	91
	18.25	12	23	47	70	120	-	15	30	45	87
19.8	12	22	45	67	130	-	14	29	43	83	
3 to 4.6	3	20	20	20	20	20	20	20	20	20	20
	4.5	26	30	30	30	30	17	30	30	30	30
	6	23	40	40	40	40	15	27	40	40	40
	7.6	20	38	50	50	50	13	24	50	50	50
	9	18	34	60	60	60	12	22	45	60	60
	10.6	17	32	65	70	70	11	20	41	62	70
	12	16	29	60	80	80	10	19	39	58	80
	13.75	15	28	56	85	90	10	18	36	54	90
	15.25	14	26	53	80	100	-	17	34	51	99
	16.75	13	25	51	76	110	-	16	33	49	94
	18.25	13	24	48	72	120	-	15	31	46	89
19.8	-	23	46	69	130	-	15	30	44	86	

Table A. 1.A Number of Orifices in a Distribution Lateral Pipe											
NPS Pipe Size of Distribution Lateral	Orifice Diameter	3/16" (4.8mm)					7/32" (5.6mm)				
		3/4" 19m m	1" 25m m	1-1/4" 32m m	1-1/2" 38m m	2" 51m m	3/4" 19m m	1" 25m m	1-1/4" 32m m	1-1/2" 38m m	2" 51m m
Squirt Height, m	Distribution Lateral Length, m	Maximum Orifices Permitted					Maximum Orifices Permitted				
.6 to 1.2	3	-	-	-	-	-	10	19	20	20	20
	4.5	-	-	-	-	-	8	15	30	30	30
	6	-	-	-	-	-	7	13	27	40	40
	7.6	-	-	-	-	-	6	12	24	36	50
	9	-	-	-	-	-	6	11	22	32	60
	10.6	-	-	-	-	-	-	10	20	30	57
	12	-	-	-	-	-	-	9	19	28	53
	13.75	-	-	-	-	-	-	9	17	26	50
	15.25	-	-	-	-	-	-	-	16	25	47
	16.75	-	-	-	-	-	-	-	16	23	45
	18.25	-	-	-	-	-	-	-	15	22	43
19.8	-	-	-	-	-	-	-	14	21	41	
1.5 to 2.75	3	14	20	20	20	20	11	20	20	20	20
	4.5	12	22	30	30	30	9	16	30	30	30
	6	10	19	38	40	40	7	14	28	40	40
	7.6	9	16	34	50	50	7	12	25	37	50
	9	8	15	30	46	60	6	11	22	34	60
	10.6	7	14	28	42	70	-	10	21	31	59
	12	-	13	26	39	75	-	10	19	29	55
	13.75	-	12	25	37	71	-	9	18	27	52
	15.25	-	11	23	35	67	-	-	17	26	49
	16.75	-	11	22	33	63	-	-	16	24	47
	18.25	-	10	21	31	60	-	-	16	23	44
19.8	-	10	20	30	58	-	-	15	22	43	
3 to 4.6	3	15	20	20	20	20	11	20	20	20	20
	4.5	12	22	30	30	30	9	16	30	30	30
	6	10	19	39	40	40	8	14	29	40	40
	7.6	9	17	35	50	50	7	13	25	38	50
	9	8	15	31	47	60	6	11	23	35	60
	10.6	8	14	29	43	70	-	10	21	32	61
	12	-	13	27	40	77	-	10	20	30	57
	13.75	-	12	25	38	73	-	9	19	28	53
	15.25	-	12	24	36	69	-	9	18	26	50
	16.75	-	11	23	34	65	-	-	17	25	48
	18.25	-	-	22	32	62	-	-	16	24	46
19.8	-	-	21	31	60	-	-	15	23	44	

Table A .1.A Number of Orifices in a Distribution Lateral Pipe											
Squirt Height, m	Orifice Diameter NPS Pipe Size of Distribution Lateral	1/4" (6.4mm)					9/32" (7.1mm)				
	Distribution Lateral m	3/4" 19m	1" 25m	1- 1/4"	1- 1/2"	2" 51m	3/4" 19m	1" 25m	1- 1/4"	1- 1/2"	2" 51mm
		Maximum Orifices Permitted					Maximum Orifices Permitted				
.6 to 1.2	3	8	15	20	20	20	6	12	20	20	20
	4.5	6	12	24	30	30	5	9	19	28	30
	6	6	10	21	31	40	4	8	16	24	40
	7.6	5	9	18	27	50	-	7	15	22	42
	9	-	8	17	25	48	-	7	13	20	38
	10.6	-	8	15	23	44	-	-	12	18	35
	12	-	-	14	21	41	-	-	11	17	32
	13.75	-	-	13	20	38	-	-	11	16	30
	15.25	-	-	13	19	36	-	-	10	15	29
	16.75	-	-	12	18	34	-	-	-	14	27
	18.25	-	-	12	17	33	-	-	-	14	26
19.8	-	-	-	16	31	-	-	-	13	25	
1.5 to 2.75	3	8	15	20	20	20	7	12	20	20	20
	4.5	7	12	25	30	30	5	10	20	30	30
	6	6	11	21	32	40	5	8	17	25	40
	7.6	5	9	19	28	50	-	7	15	22	43
	9	-	9	17	26	49	-	7	14	20	39
	10.6	-	8	16	24	46	-	-	13	19	36
	12	-	-	15	22	42	-	-	12	18	34
	13.75	-	-	14	21	40	-	-	11	16	32
	15.25	-	-	13	20	38	-	-	10	16	30
	16.75	-	-	13	19	36	-	-	-	15	28
	18.25	-	-	12	18	34	-	-	-	14	27
19.8	-	-	-	17	33	-	-	-	14	26	
3 to 4.6	3	8	16	20	20	20	7	12	20	20	20
	4.5	7	13	26	30	30	5	10	20	30	30
	6	6	11	22	33	40	5	9	17	26	40
	7.6	5	10	20	29	50	-	8	16	23	44
	9	-	9	18	26	51	-	7	14	21	40
	10.6	-	8	16	24	47	-	-	13	19	37
	12	-	8	15	23	44	-	-	12	18	35
	13.75	-	-	14	21	41	-	-	11	17	32
	15.25	-	-	14	20	39	-	-	11	16	31
	16.75	-	-	13	19	37	-	-	-	15	29
	18.25	-	-	12	18	35	-	-	-	15	28
19.8	-	-	-	18	34	-	-	-	14	27	



Table A. 1.A Number of Orifices in a Distribution Lateral Pipe						
	Orifice Diameter NPS Pipe Size of Distribution Lateral	5/16" (7.9mm)				
		3/4" 19mm	1" 25mm	1-1/4" 32mm	1-1/2" 38mm	2" 51mm
Squirt Height, m	Distribution Lateral Length, m	Maximum Orifices Permitted				
.6 to 1.2	3	5	9	19	20	20
	4.5	4	8	16	23	30
	6	4	7	13	20	38
	7.6	-	6	12	18	34
	9	-	-	11	16	31
	10.6	-	-	10	15	28
	12	-	-	9	14	26
	13.75	-	-	9	13	25
	15.25	-	-	-	12	23
	16.75	-	-	-	12	22
	18.25	-	-	-	-	21
19.8	-	-	-	-	20	
1.5 to 2.75	3	5	10	20	20	20
	4.5	4	8	16	24	30
	6	4	7	14	21	39
	7.6	-	6	12	18	35
	9	-	6	11	17	32
	10.6	-	-	10	15	29
	12	-	-	10	14	27
	13.75	-	-	9	13	26
	15.25	-	-	-	13	24
	16.75	-	-	-	12	23
	18.25	-	-	-	-	22
19.8	-	-	-	-	21	
3 to 4.6	3	5	10	20	20	20
	4.5	4	8	17	25	30
	6	4	7	14	21	40
	7.6	-	6	13	19	36
	9	-	6	11	17	33
	10.6	-	-	11	16	30
	12	-	-	10	15	28
	13.75	-	-	9	14	26
	15.25	-	-	-	13	25
	16.75	-	-	-	12	24
	18.25	-	-	-	12	23
19.8	-	-	-	-	22	

<b>A.1.B.2 Orifice Discharge Rate in Litres per Minute</b>									
<b>Pressure Head, mm</b>	<b>Orifice Diameter, mm (in.)</b>								
	<b>3.2 mm (1/8")</b>	<b>4.0 mm (5/32")</b>	<b>4.8 mm (3/16")</b>	<b>5.6 mm (7/32")</b>	<b>6.4 mm (1/4")</b>	<b>7.1 mm (9/32")</b>	<b>7.9 mm (5/16")</b>	<b>8.7 mm (11/32")</b>	<b>9.5 mm (3/8")</b>
<b>600</b>	-	-	-	3.02	3.95	4.99	6.17	7.46	8.88
<b>750</b>	-	-	-	3.38	4.41	5.58	6.89	8.34	9.93
<b>900</b>	-	-	-	3.70	4.83	6.12	7.55	9.14	10.87
<b>1050</b>	-	-	-	4.00	5.22	6.61	8.16	9.87	11.75
<b>1200</b>	-	-	-	4.27	5.58	7.06	8.72	10.55	12.56
<b>1350</b>	-	-	-	4.53	5.92	7.49	9.25	11.19	13.32
<b>1500</b>	1.56	2.44	3.51	4.78	6.24	7.90	9.75	11.80	14.04
<b>1650</b>	1.64	2.56	3.68	5.01	6.54	8.28	10.23	12.37	14.72
<b>1800</b>	1.71	2.67	3.84	5.23	6.84	8.65	10.68	12.92	15.38
<b>1950</b>	1.78	2.78	4.00	5.45	7.11	9.00	11.12	13.45	16.01
<b>2100</b>	1.85	2.88	4.15	5.65	7.38	9.34	11.54	13.96	16.61
<b>2250</b>	1.91	2.99	4.30	5.85	7.64	9.67	11.94	14.45	17.19
<b>2400</b>	1.97	3.08	4.44	6.04	7.89	9.99	12.33	14.92	17.76
<b>2550</b>	2.03	3.18	4.58	6.23	8.14	10.30	12.71	15.38	18.30
<b>2700</b>	2.09	3.27	4.71	6.41	8.37	10.60	13.08	15.83	18.84
<b>2850</b>	2.15	3.36	4.84	6.58	8.60	10.89	13.44	16.26	19.35
<b>3000</b>	2.21	3.45	4.96	6.76	8.82	11.17	13.79	16.68	19.85
<b>3150</b>	2.26	3.53	5.09	6.92	9.04	11.44	14.13	17.10	20.34
<b>3300</b>	2.31	3.62	5.21	7.09	9.25	11.71	14.46	17.50	20.82
<b>3450</b>	2.37	3.70	5.32	7.25	9.46	11.98	14.79	17.89	21.29
<b>3600</b>	2.42	3.78	5.44	7.40	9.67	12.23	15.10	18.28	21.75
<b>3750</b>	2.47	3.85	5.55	7.55	9.87	12.49	15.42	18.65	22.20
<b>3900</b>	2.52	3.93	5.66	7.70	10.06	12.73	15.72	19.02	22.64
<b>4050</b>	2.56	4.01	5.77	7.85	10.25	12.98	16.02	19.38	23.07
<b>4200</b>	2.61	4.08	5.87	7.99	10.44	13.21	16.31	19.74	23.49
<b>4350</b>	2.66	4.15	5.98	8.14	10.63	13.45	16.60	20.09	23.91
<b>4500</b>	2.70	4.22	6.08	8.27	10.81	13.68	16.89	20.43	24.32

A.1.C.2 Friction Loss in mm Pressure Head per 30.5 Metres in Schedule 40 PVC Pipe (C = 150)						
Flow in L/min	Nominal Pipe Diameter (in.)					
	19 mm (3/4")	25 mm (1")	32 mm (1 1/4")	38 mm (1 1/2")	51 mm (2")	76 mm (3")
5	128	40	10	5	1	0
10	462	143	38	18	5	1
15	979	302	80	38	11	2
20	1667	515	136	64	19	3
25	2519	778	205	97	29	4
30	3530	1090	287	136	40	6
35	4695	1450	382	180	53	8
40	6010	1857	489	231	68	10
45	7473	2309	608	287	85	12
50	9082	2806	739	349	103	15
55	10833	3347	881	416	123	18
60	12725	3931	1035	489	145	21
65	14756	4559	1200	567	168	25
70		5228	1377	650	193	28
75		5940	1564	739	219	32
80		6694	1763	833	247	36
85		7488	1972	931	276	40
90		8323	2192	1035	307	45
95		9199	2422	1144	339	50
100		10114	2663	1258	373	55
120		14172	3732	1763	523	77
140			4963	2344	695	102
160			6354	3001	890	130
180			7901	3732	1107	162
200			9602	4535	1345	197
220			11453	5410	1604	235
240				6355	1884	276
260				7369	2185	320
280				8452	2506	367
300				9603	2847	417
320				10820	3208	470
340					3589	525
360					3989	584
380					4409	645
400					4848	710
450					6028	882
500					7325	1072
550					8738	1279
600						1502
700						1998
800						2558
900						3181

A.1.C.4 Friction Loss in mm Pressure Head per 30.5 Metres in Polyethylene Pipe						
Flow in L/min.	Nominal Pipe Diameter (in.)					
	19 mm (3/4")	25 mm (1")	32 mm (1 1/4")	38 mm (1 1/2")	51 mm (2")	76 mm (3")
5	133	41	11	5	2	0
10	480	148	39	18	5	1
15	1016	314	83	39	12	2
20	1731	535	141	67	20	3
25	2615	808	213	100	30	4
30	3664	1132	298	141	42	6
35	4873	1506	396	187	56	8
40	6239	1927	508	240	71	10
45	7758	2397	631	298	88	13
50	9428	2912	767	362	107	16
55	11246	3474	915	432	128	19
60	13210	4081	1075	508	151	22
65	15318	4732	1246	589	175	26
70		5428	1429	675	200	29
75		6166	1624	767	227	33
80		6948	1830	864	256	38
85		7773	2047	967	287	42
90		8640	2275	1075	319	47
95		9549	2515	1188	352	52
100		10500	2765	1306	387	57
120		14711	3874	1830	543	79
140			5152	2434	722	106
160			6596	3116	924	135
180			8202	3874	1149	168
200			9967	4708	1396	204
220			11889	5616	1665	244
240				6597	1956	286
260				7650	2268	332
280				8774	2601	381
300				9968	2956	433
320				11232	3330	488
340					3726	545
360					4141	606
380					4577	670
400					5032	737

A.1.C.4 Friction Loss in mm Pressure Head per 30.5 Metres in Polyethylene Pipe						
Flow in L/min.	Nominal Pipe Diameter (in.)					
	19 mm (3/4")	25 mm (1")	32 mm (1 1/4")	38 mm (1 1/2")	51 mm (2")	76 mm (3")
450					6258	916
500					7604	1113
550					9071	1328
600						1560
700						2074
800						2656
900						3302

**Figure 9: Table A.1.D.1 Liquid Volumes of Pipe**

Nominal Pipe Diameter, Inches	Volume (per 100 feet of pipe)	
	Litres	Imp Gallons
19 mm (3/4")	8.7	1.9
25 mm (1")	17	3.74
32 mm (1 1/4")	30	6.48
38 mm (1 1/2")	40	8.82
51 mm (2")	66	14.66
76 mm 3")	145	30
102 mm (4")	250	55.1

**Note:** The values contained within the shaded areas in the previous charts represent a flow velocity within the desired range of 600–1500 mm (2 - 5 ft)/second. Flow velocity should exceed 600 mm (2 ft)/second to achieve required scouring of deposits and growth on pipe walls cause by the effluent. Flow velocity over 1500 mm (5 ft)/ second should be used cautiously due to excessive pressure being created from sudden flow stops caused by quick closing valves or shock occurring from trapped air in portions of the effluent lines. This is also called cavitation.

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**Table A.1.B.2 Orifice Discharge Rate in Litres per Minute**

Pressure Head, Mm	Orifice Diameter in mm								
	3.2	4.0	4.8	5.6	6.4	7.1	7.9	8.7	9.5
600	-	-	-	3.00	3.96	5.00	6.18	7.46	8.86
750	-	-	-	3.36	4.41	5.59	6.91	8.32	9.91
900	-	-	-	3.68	4.82	6.14	7.55	9.14	10.87
1050	-	-	-	4.00	5.23	6.59	8.14	9.87	11.73
1200	-	-	-	4.27	5.59	7.05	8.73	10.55	12.55
1350	-	-	-	4.55	5.91	7.50	9.23	11.18	13.32
1500	1.56	2.44	3.51	4.78	6.24	7.90	9.75	11.80	14.04
1650	1.64	2.55	3.68	5.00	6.55	8.27	10.23	12.36	14.72
1800	1.73	2.68	3.86	5.23	6.82	8.64	10.68	12.91	15.37
1950	1.77	2.77	4.00	5.46	7.09	9.00	11.14	13.46	16.00
2100	1.86	2.86	4.14	5.64	7.36	9.36	11.55	13.96	16.59
2250	1.91	3.00	4.32	5.86	7.64	9.68	11.96	14.46	17.18
2400	1.95	3.09	4.46	6.05	7.91	10.00	12.32	14.91	17.78
2550	2.05	3.18	4.59	6.23	8.14	10.27	12.73	15.37	18.32
2700	2.09	3.27	4.73	6.41	8.36	10.59	13.09	15.82	18.82
2850	2.14	3.36	4.82	6.59	8.59	10.87	13.46	16.28	19.37
3000	2.23	3.46	4.96	6.77	8.82	11.18	13.77	16.68	19.87
3150	2.27	3.55	5.09	6.91	9.05	11.46	14.14	18.28	20.37
3300	2.32	3.64	5.23	7.09	9.27	11.73	14.46	17.50	20.82
3450	2.36	3.68	5.32	7.23	9.46	11.96	14.77	17.91	21.58
3600	2.41	3.77	5.46	7.41	9.68	12.22	15.09	18.28	21.73
3750	2.45	3.86	5.55	7.55	9.87	12.50	15.41	18.64	22.18
3900	2.50	3.91	5.64	7.68	10.05	12.73	15.73	19.00	22.64
4050	2.55	4.00	5.77	7.86	10.27	12.96	16.00	19.37	23.05
4200	2.59	4.09	5.86	8.00	10.46	13.23	16.32	19.73	23.50
4350	2.64	4.14	5.96	8.14	10.64	13.46	16.59	20.09	23.91
4500	2.68	4.23	6.09	8.27	10.82	13.68	16.87	20.41	24.32
4850	2.77	4.36	6.27	8.55	11.18	14.14	17.47	21.09	25.09
5500	2.95	4.64	6.64	9.05	11.82	15.00	18.50	22.37	26.64
6000	3.14	4.86	7.00	9.55	12.50	15.77	19.50	23.59	28.09
6750	3.27	5.09	7.36	10.00	13.09	16.55	20.46	24.73	29.46
7250	3.41	5.32	7.68	10.46	13.68	17.32	21.37	25.87	30.78
8000	3.55	5.55	8.00	10.91	14.23	18.00	22.23	26.91	32.00
8500	3.68	5.77	8.32	11.32	14.77	18.68	23.09	27.91	33.23
9000	3.82	5.96	8.59	11.67	15.27	19.37	23.87	28.91	34.37
9750	3.96	6.18	8.86	12.09	15.77	19.96	24.69	29.82	35.50
10500	4.05	6.36	9.14	12.46	16.28	20.59	25.41	30.78	36.60
11000	4.18	6.55	9.41	12.82	16.73	21.18	26.14	31.64	37.68
11500	4.32	6.73	9.68	13.18	17.18	21.77	26.87	32.50	38.69
12000	4.41	6.91	9.91	13.50	17.64	22.32	27.59	33.37	39.69
12500	4.50	7.05	10.18	13.87	18.09	22.87	28.28	34.19	40.69
13000	4.64	7.23	10.41	14.18	18.50	23.41	28.91	35.00	41.64
14000	4.73	7.41	10.64	14.50	18.91	23.96	29.55	35.78	42.60
14500	4.82	7.55	10.87	14.82	19.32	24.46	30.19	36.55	43.51
15000	4.96	7.73	11.09	15.09	19.73	24.96	30.82	37.32	44.42

Discharge rates from orifices are based on:

$$q = 16.37Cd^2h^{1/2}$$

where

q = Imperial Gallons per minute flow

C = coefficient of discharge (0.60)

d = orifice diameter in inches

h = pressure head in feet

Use A Minimum 5.0 ft. (1500 mm) Pressure Head for orifices 3/16" and smaller.

Note: Most pump manufacturers rate pump capacities in US gallons. Selecting the pump will require converting the pump rating in US gallons to Imperial gallons or converting the results from this table to US gallons.

US Gallons = Imperial Gallons x 1.2

Imperial Gallons = US Gallons x 0.83

*Note: This table is used to determine the flow rate of an orifice size at a selected pressure head. To determine the total flow, multiply the flow rate for an orifice by the number of orifices in the distribution lateral pipes.*

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environmentally  
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