National Onsite Wastewater Recycling Association

Decentralized Wastewater Glossary

Third Edition*

Reference Tables

June 2026

Originally published in 2007 by the Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT), the Glossary has been updated and converted to an online format. The Reference Tables presented here originally appeared as an Appendix in previous editions.

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Reference Tables

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Table 1: Conversion factors

MULTIPLY	BY	TO OBTAIN
Acres	43560	Square Feet
Atmospheres	33.9	Feet of water
Centimeters	0.3937	Inches
Cubic Feet	7.48052	Gallons
Cubic Feet	28.32	Liters
Cubic Feet/sec.	449	Gallons/Min.
Cubic Meters	35.31	Cubic Feet
Cubic Meters	264.2	Gallons
Cubic Meters	10^3	Liters
Cubic yards	27	Cubic Feet
Cubic yards	202	Gallons
Feet	30.48	Centimeters
Feet	0.3048	Meters
Feet of Water	62.43	Lbs/sq. ft.
Feet of Water	0.434	PSI (lbs/sq. in.)
Gallons	3785	Cubic Centimeters
Gallons	0.1337	Cubic Feet
Gallons	3.785	Liters
Gallons water	8.3453	Pounds of water
Gallons/min.	2.228×10^{-3}	Cubic feet/sec.
Gallons/min.	1440	Gallons/day
Gallons/min.	0.06308	Liters/sec.
Gallons/day	6.944×10^{-4}	Gallons/min.
Gallons/day/sq.ft.	1.604	Inches/day
Grams	2.205×10^{-3}	Pounds
Grams/liter	1000	Parts/million
Hectares	2.471	Acres
Horsepower	33,000	Foot-Lbs/min.
Horsepower	0.7457	Kilowatts
Inches	2.54	Centimeters
Inches/day	0.6234	Gallons/day/sq.ft.
Kilograms	2.205	Lbs.
Kilowatts	1.341	Horsepower
Kilowatt-hours	2.655×10^6	Foot-Lbs.
Liters	103	Cubic Centimeters
Liters	0.03531	Cubic Feet
Liters	0.2642	Gallons
Meters	3.281	Feet
Milligrams/liters	1	Parts/million
Million gals./day	1.54723	Cubic ft./sec.
Parts/million	8.345	Lbs/million gal.
Pounds	453.5024	Grams
Pounds of water	0.1198	Gallons
psi (lbs/sq.in.)	2.31	Feet of water
Square feet	2.296×10^{-5}	Acres
Temp. (°C) + 17.78	1.8	Temp. (°F)
Temp. (°F) - 32	5/9	Temp. (°C)

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Table 2: Friction loss (feet) in Schedule 40 PVC piping at varying flow rate

	Pipe nominal size and inside diameter (inches)					
Flow (GPM)	**1" (1.049")**	**1-1/4" (1.38")**	**1-1/2" (1.61")**	**2" (2.067")**	**3" (3.068")**	**4" (4.026")**
	Friction loss (feet)					
1	0.09					
2	0.32	0.09				
3	0.68	0.18	0.08			
4	1.17	0.31	0.14			
5	1.76	0.46	0.22	0.06		
6	2.47	0.65	0.31	0.09		
7	3.28	0.86	0.41	0.12		
8	4.2	1.1	0.52	0.15		
9	5.22	1.37	0.65	0.19		
10	6.35	1.67	0.79	0.23		
11	7.57	1.99	0.94	0.28		
12		2.34	1.1	0.33		
13		2.71	1.28	0.38		
14		3.11	1.47	0.43	0.06	
15		3.54	1.67	0.49	0.07	
16		3.98	1.88	0.56	0.08	
17		4.46	2.1	0.62	0.09	
19		5.47	2.58	0.77	0.11	
20		6.02	2.84	0.84	0.12	
25			4.29	1.27	0.19	
30			6.02	1.78	0.26	0.07
35				2.37	0.35	0.09
45				3.77	0.55	0.15
50				4.58	0.67	0.25
60				6.42	0.94	0.33
70					1.25	0.43
80					1.6	0.53
90					1.99	0.64
100					2.41	0.97
125					3.65	1.36
150					5.11	1.81
175					6.8	2.32
200						2.88
225						3.5
250						4.18
275						4.91
300						5.69
350						6.53
375						7.41

$H_f=(0.00113 \times L \times Q^{1.85})/d^{4.87}$

Where:

H_f =head loss (feet); L= pipe length (feet)

Q = flow (gpm); d=pipe inside diameter (inches)

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Table 3: Friction loss through Schedule 40 fittings: equivalency in piping length (feet)

DIAMETER OF FITTING (inches)	90 DEG. STANDARD ELL	45 DEG. STANDARD ELL	90 DEG. STANDARD TEE	COUPLING OR STRAIGHT RUN OF TEE	GATE VALVE	GLOBE VALVE	CHECK VALVE
	Friction loss equivalency in piping length (feet)						
3/8	1	0.6	1.5	0.3	0.2	8	3
1/2	2	1.2	3	0.6	0.4	15	5
3/4	2.5	1.5	4	0.8	0.5	20	7
1	3	1.8	5	0.9	0.6	25	8
1 1/4	4	2.4	6	1.2	0.8	35	11
1 1/2	5	3	7	1.5	1	45	14
2	7	4	10	2	1.3	55	19
2 1/2	8	5	12	2.5	1.6	65	22
3	10	6	15	3	2	80	27
3 1/2	12	7	18	3.6	2.4	100	32
4	14	8	21	4	2.7	125	38
5	17	10	25	5	3.3	140	46
6	20	12	30	6	4	165	54

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Table 4: Pipeline volume for rigid and flexible piping

4a: Volume (gallons) per foot of piping

	Pipe Size (inches)	Piping specification				
		SDR 26 (Class 160)	SDR 21 (Class 200)	Sch 40	Sch 80	Corrugated Tubing
Volume (gallons per foot of piping)	0.75			0.028	0.022	
	1	0.058	0.058	0.045	0.037	
	1.25	0.096	0.092	0.078	0.067	
	1.5	0.126	0.121	0.106	0.092	
	2	0.196	0.188	0.174	0.153	
	3	0.426	0.409	0.384	0.343	
	4	0.704	0.677	0.66	0.597	0.653
	6	1.53	1.47	1.5	1.35	1.47
	8	2.59	2.49	2.6	2.37	

4b: Volume (gallons) per 100 feet of piping

	Pipe Size (inches)	Piping specification				
		SDR 26 (Class 160)	SDR 21 (Class 200)	Sch 40	Sch 80	Corrugated Tubing
Volume (gallons per 100 feet of piping)	0.75			2.8	2.2	
	1	5.8	5.8	4.5	3.7	
	1.25	9.6	9.2	7.8	6.7	
	1.5	12.6	12.1	10.6	9.2	
	2	19.6	18.8	17.4	15.3	
	3	42.6	40.9	38.4	34.3	
	4	70.4	67.7	66	59.7	65.3
	6	153	147	150	135	147
	8	259	249	260	237	

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Table 5: Orifice flow* (gallons per minute) for low-pressure distribution applications

Operating pressure (feet)	Orifice Size (inches)									
	3/32" 0.094"	1/8" 0.125"	5/32" 0.156"	3/16" 0.188"	7/32" 0.219"	1/4" 0.25"	9/32" 0.281"	5/16" 0.313"	11/32" 0.344"	3/8" 0.375"
2.0	0.15	0.26	0.41	0.59	0.80	1.04	1.32	1.63	1.97	2.34
2.1	0.15	0.27	0.42	0.60	0.82	1.07	1.35	1.67	2.02	2.40
2.2	0.15	0.27	0.43	0.61	0.84	1.09	1.38	1.71	2.07	2.46
2.3	0.16	0.28	0.44	0.63	0.86	1.12	1.41	1.75	2.11	2.51
2.4	0.16	0.29	0.45	0.64	0.87	1.14	1.44	1.78	2.16	2.57
2.5	0.16	0.29	0.46	0.66	0.89	1.17	1.47	1.82	2.20	2.62
2.6	0.17	0.30	0.46	0.67	0.91	1.19	1.50	1.86	2.25	2.67
2.7	0.17	0.30	0.47	0.68	0.93	1.21	1.53	1.89	2.29	2.72
2.8	0.17	0.31	0.48	0.69	0.94	1.23	1.56	1.93	2.33	2.77
2.9	0.18	0.31	0.49	0.71	0.96	1.25	1.59	1.96	2.37	2.82
3.0	0.18	0.32	0.50	0.72	0.98	1.28	1.62	1.99	2.41	2.87
3.1	0.18	0.32	0.51	0.73	0.99	1.30	1.64	2.03	2.45	2.92
3.2	0.19	0.33	0.51	0.74	1.01	1.32	1.67	2.06	2.49	2.97
3.3	0.19	0.33	0.52	0.75	1.02	1.34	1.69	2.09	2.53	3.01
3.4	0.19	0.34	0.53	0.76	1.04	1.36	1.72	2.12	2.57	3.06
3.5	0.19	0.34	0.54	0.78	1.06	1.38	1.74	2.15	2.61	3.10
3.6	0.20	0.35	0.55	0.79	1.07	1.40	1.77	2.18	2.64	3.15
3.7	0.20	0.35	0.55	0.80	1.09	1.42	1.79	2.21	2.68	3.19
3.8	0.20	0.36	0.56	0.81	1.10	1.44	1.82	2.24	2.72	3.23
3.9	0.20	0.36	0.57	0.82	1.11	1.46	1.84	2.27	2.75	3.27
4.0	0.21	0.37	0.58	0.83	1.13	1.47	1.87	2.30	2.79	3.32
4.1	0.21	0.37	0.58	0.84	1.14	1.49	1.89	2.33	2.82	3.36
4.2	0.21	0.38	0.59	0.85	1.16	1.51	1.91	2.36	2.86	3.40
4.3	0.21	0.38	0.60	0.86	1.17	1.53	1.93	2.39	2.89	3.44
4.4	0.22	0.39	0.60	0.87	1.18	1.55	1.96	2.42	2.92	3.48
4.5	0.22	0.39	0.61	0.88	1.20	1.56	1.98	2.44	2.96	3.52
4.6	0.22	0.40	0.62	0.89	1.21	1.58	2.00	2.47	2.99	3.56
4.7	0.22	0.40	0.62	0.90	1.22	1.60	2.02	2.50	3.02	3.59
4.8	0.23	0.40	0.63	0.91	1.24	1.61	2.04	2.52	3.05	3.63
4.9	0.23	0.41	0.64	0.92	1.25	1.63	2.06	2.55	3.08	3.67
5.0	0.23	0.41	0.64	0.93	1.26	1.65	2.09	2.57	3.12	3.71

*Figures based on orifice equation: $Q=11.79d^2h^{0.5}$

Where:

Q=flow per orifice (gpm)
d=diameter of orifice (inches)
h= operating pressure or head (feet)

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Table 6: Orifice flow for pressure manifold applications

6a. Orifice flow* in gallons per minute (Schedule 40 taps)

	Orifice size (inches)					
Operating pressure (feet)	**1/2" (0.622")**	**3/4" (0.824")**	**1" (1.049")**	**1-1/4" (1.38")**	**1-1/2" (1.61")**	**2" (2.067")**
1.5	6.16	10.8	17.5	30.3	41.3	68
2	7.11	12.5	20.2	35	47.7	78.5
2.5	7.95	14	22.6	39.1	53.3	87.8
3	8.71	15.3	24.8	42.9	58.4	96.2
3.5	9.41	16.5	26.8	46.3	63	104
4	10.1	17.7	28.6	49.5	67.4	111

6b. Orifice flow* in gallons per minute (Schedule 80 taps)

	Orifice Size (inches)					
Operating pressure (feet)	**1/2" (0.546")**	**3/4" (0.742")**	**1" (0.957")**	**1-1/4" (1.278")**	**1-1/2" (1.50")**	**2" (1.939")**
1.5	4.75	8.77	14.6	26	35.8	59.9
2	5.48	10.1	16.8	30	41.4	69.1
2.5	6.13	11.3	18.8	33.6	46.2	77.3
3	6.71	12.4	20.6	36.8	50.7	84.7
3.5	7.25	13.4	22.3	39.7	54.7	91.4
4	7.75	14.3	23.8	42.5	58.5	97.8

*Figures based on orifice equation: $Q=13d^2h^{1/2}$

Where:
Q = flow per orifice (gpm)
d = diameter of orifice (inches)
h = operating pressure or head (feet)

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Table 7: Required flow rate (gallons per minute) to achieve two Feet per second velocity through rigid and flexible PVC piping

Schedule 40 PVC		Schedule 80 PVC		SDR 21		SDR 26	
Nominal Dia. (inches)	Flow Rate (gpm)	Nominal Dia. (inches)	Flow Rate (gum)	Nominal Dia. (inches)	Flow Rate (gpm)	Nominal Dia. (inches)	Flow Rate (gpm)
1	5.4	1	4.5	1	7.2	1	7
1 1/4	9.3	1 ¼	8	1 ¼	11.1	1 ¼	11.5
1 1/2	14.2	1 ½	12.4	1 ½	14.5	1 ½	15.1
2	20.9	2	18.4	2	22.6	2	23.5
2 1/2	29.8	2 1/2	26.4	2 1/2	33.1	2 1/2	39.9
3	46.1	3	41.2	3	49.1	3	51.1
4	79.4	4	71.7	4	82.2	4	84.5
6	180	6	162.5	6	175.8	6	183.1

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