

UNIVERSITY OF IDAHO — FACT SHEET

Hydraulic Relationships and Performance, Soil and Water Relationships

NOZZLE DISCHARGE IN GALLONS PER MINUTE

HYDRAULIC RELATIONSHIPS

*** NOZZLE DIAMETER IN INCHES ***										PRESSURE: (P)*MAY BE IN PSI OR EQUIVALENT FEET OF WATER 1.0 psi = 2.31 feet
psi	3/32	1/8	9/64	5/32	11/64	3/16	13/64	7/32	17/64	
20	1.17	2.09	2.65	3.26	3.92	4.69	5.51	6.37	7.13	FLOW: (Q)*MAY BE IN CFS OR EQUIVALENT GAL. PER MIN. 1.0 cfs = 449 gpm
25	1.31	2.34	2.96	3.64	4.38	5.25	6.16	7.13	8.16	
30	1.44	2.56	3.26	4.01	4.83	5.75	6.80	7.86	8.99	POWER: MAY BE IN KILLOWATTS (KW), WATER HORSEPOWER (WHP), and, ELECT. HORSEPOWER (EHP) 1.0 KW = 1.34 EHP 1.0 EHP = 0.746 KW WHP = Q(gpm) X P(ft) / 3960 KW = 1.732 X V X A X PF/1000
35	1.55	2.77	3.50	4.31	5.18	6.21	7.30	8.43	9.60	
40	1.66	2.96	3.74	4.61	5.54	6.64	7.80	9.02	10.29	EFFICIENCY: (EFF) MAY BE WATER TO WIRE ... WHP / EHP FLUID TO SHAFT .. WHP / SHP
45	1.76	3.13	3.99	4.91	5.91	7.03	8.30	9.60	10.95	
50	1.85	3.30	4.18	5.15	6.19	7.41	8.71	10.10	11.58	VOLUME: ACRE FT. OR ACRE IN. 1.0 cfs = 1.98 AF / DAY 1.0 AF = 12.0 AI
55	1.94	3.46	4.37	5.39	6.48	7.77	9.12	10.50	12.00	
60	2.03	3.62	4.50	5.65	6.80	8.12	9.56	11.05	12.65	
65	2.11	3.77	4.76	5.87	7.06	8.45	9.92	11.45	13.15	
70	2.19	3.91	4.96	6.10	7.34	8.78	10.32	11.95	13.65	
75	2.27	4.05	5.12	6.30	7.58	9.08	10.66	12.32	14.05	
80	2.35	4.18	5.29	6.52	7.84	9.39	11.02	12.74	14.65	
85	2.42	4.31	5.45	6.71	8.07	9.67	11.35	13.11	15.25	
90	2.49	4.43	5.61	6.91	8.31	9.95	11.69	13.51	15.85	
95	2.56	4.56	5.76	7.09	8.53	10.20	11.99	13.86	16.45	
100	2.63	4.67	5.91	7.29	8.76	10.50	12.32	14.23	17.05	
$Q(gpm) = 30.0 \times D(in.)^2 \times P(psi)^{0.5}$										

h = AVERAGE APPLICATION RATE IN INCHES PER HOUR

spacing	2	3	4	5	6	7	8	9	10	11	12	spacing
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
* gallons per minute per sprinkler *												
20x20	.48	0.72	0.96	1.20	1.44	1.70	1.93	2.16	2.40	2.64	x.x	20x20
20x30	.32	0.48	0.64	0.80	0.96	1.12	1.28	1.43	1.60	1.76	1.9	20x30
20x40	.24	0.36	0.48	0.60	0.72	0.84	0.96	1.08	1.20	1.32	1.4	20x40
30x30	.21	0.32	0.43	0.54	0.64	0.75	0.88	0.96	1.07	1.17	1.2	30x30
30x40	.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72	0.80	0.88	0.9	30x40
30x50	.13	0.19	0.25	0.32	0.38	0.45	0.51	0.58	0.64	0.70	0.7	30x50
40x40	.12	0.18	0.24	0.30	0.36	0.42	0.48	0.54	0.60	0.66	0.7	40x40
40x50	.10	0.14	0.19	0.24	0.29	0.34	0.38	0.43	0.48	0.53	0.5	40x50
40x60	.xx	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.4	40x60

LONG-TERM BASIC SOIL INFILTRATION RATES	PEAK APPLICATION RATE FOR PIVOTS
AGGREGATED-STRUCTURED-BARE-OPEN SOIL	POOR SOIL
Course Sand. (*0.9) > 0.75 - 1.00"/hr.	0.35"/hr.
Fine Sands. (*1.2) > 0.50 - 0.75"/hr.	0.25"/hr.
Fine S.Loam. (*1.9) > 0.35 - 0.50"/hr.	0.20"/hr.
Silt Loam. (*2.3) > 0.25 - 0.40"/hr.	0.13"/hr.
Clay Loam. (*2.2) > 0.10 - 0.30"/hr.	0.07"/hr.
For 10 - minute SHORT-TERM rate, multiply by 6	
(*X.X) = Aprox. Water Holding Capacity (in./ft.)	
	EXPECTED IRRIGATION EFFICIENCIES
	Sprinkler 50 to 70%
	Drop Sprays 60 to 80%
	Level Boarder 50 to 80%
	Furrow 20 to 50%