



Irrigation ASSOCIATION CERTIFICATION PROGRAM

Certified Irrigation Designer, General Agriculture

Basic and non-irrigation equations and conversions are assumed to be known by candidates. POI refers to Principles of Irrigation, Irrigation Association 3rd Edition. 6th ed. refers to Irrigation, Irrigation Association. The equations are presented in the latest IA format and may appear different from those presented in the reference material.

1 cubic foot of water = 7.48 gallons	1 acre-inch = 27,154 gallons	1 acre-foot = 325,848 gallons	
$WC = \frac{WW - DW}{DW} \times 100$	POI 2-1	$AW = FC - PWP$	POI 5-1
$RAW = AW \times \frac{MAD}{100}$	POI 2-3	$AW_D = \frac{AW}{100} \times \frac{BD_{soil}}{BD_{water}} \times D$	POI 2-2
$PAW = AW \times RZ$	POI 2-4	$AD = PAW \times (MAD / 100)$	POI 2-5
$ET_c = ET_o \times K_c$	POI 2-8	This space intentionally left blank.	
$Q = \frac{18.86 \times A \times ET_c}{t \times (E_a / 100)}$	POI 5-6	$H = 2.31 \times P$	POI 8-1
$Q = A \times V$	POI 8-2	$V = \frac{0.408 \times Q}{ID^2}$	POI 8-3
$H_v = \frac{V^2}{2 \times g}$	POI 8-4	$H_{p1} + \frac{V_1^2}{2 \times g} + Z_1 = H_{p2} + \frac{V_2^2}{2 \times g} + Z_2 + H_L$	6 th ed. Ch. 7 p. 221
$H_z = k_z \times \frac{V^2}{2 \times g}$ Z = various values depending upon equation	POI 8-8, 8-9. 8-10, 8-11	$k = \left(1 - \frac{D_1^2}{D_2^2} \right)^2$	POI 8-12
$k = 0.7 \times \left(1 - \frac{D_1^2}{D_2^2} \right)^2$	POI 8-13	$H_f = 0.2083 \times \left(\frac{100}{C} \right)^{1.852} \times \frac{Q^{1.852}}{D^{4.866}} \times \frac{L}{100}$	POI 8-7
$Q = k \times C \times A \times \sqrt{P}$	POI 8-17	$\frac{Q}{Q_0} = \sqrt{\frac{P}{P_0}}$	6 TH ed ch. 7 p. 254



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$PR = \frac{96.3 \times Q}{A}$ <p>Various A values</p> $A = S_1 \times S_2$ $A = 0.866 \times S^2$ $A = 0.8 \times D_t \times S$	POI 3-2, 3-4, 3-5	$Whp = \frac{Q \times H}{3,960}$	POI 9-2
$NPSHa = H_a - H_s - H_f - H_{vp}$	POI 9-1	$Bhp = \frac{Q \times H}{3,960 \times (E_p / 100)}$	POI 9-3
$\frac{Q_2}{Q_1} = \frac{N_2}{N_1}$	POI 9-5	$\frac{H_2}{H_1} = \left(\frac{N_2}{N_1} \right)^2$	POI 9-5
$\frac{Bhp_2}{Bhp_1} = \left(\frac{N_2}{N_1} \right)^3$	POI 9-5	$\frac{Q_2}{Q_1} = \frac{D_2}{D_1}$	POI 9-6
$\frac{H_2}{H_1} = \left(\frac{D_2}{D_1} \right)^2$	POI 9-6	$\frac{Bhp_2}{Bhp_1} = \left(\frac{D_2}{D_1} \right)^3$	POI 9-6
$V = I \times R$	POI 10-1	$R_w = \frac{1,000 \times AVL}{2 \times L \times I}$	POI C2-1
$IN_m = \frac{AD}{ET_c}$	POI 5-3	$IR_{gross} = \frac{IR_{net}}{E_a / 100}$	POI 5-4
$RT = 60 \times \frac{IR_{gross}}{PR}$	POI 5-5	$IR_{net} = IN_a \times ET_c$	POI 5-4 similar
$SLD = \frac{\text{Initial cost} - \text{End of life value}}{\text{Years of life}}$	6 th ed. eq. 15.5 p. 616	$A = P \times CRF$	6 th ed. Eq. 15.3 p. 615