

PALMER-BOWLUS FLOW EQUATIONS

NOTE: Because of the throat configuration in the Palmer-Bowlus flumes, no single flow equation will describe the head curve for all sizes of the flume. Following are two formulas for each size unit that approximate the actual flow curve for the flume.

The short formula (a) in the first equation gives a close fit for most of the flumes operating range, but will deviate slightly at the upper and lower ends of the curve.

The long formula (b) fits the flow curve over the entire flow range.

4" Palmer-Bowlus: (a) $Q = 1.73 \times (H + .00588)^{1.9573}$ or,
(b) $Q = -0.000491374 + 0.052219H + 1.815283H^2 - 3.352818H^3 + 7.682511H^4 + 79.0388H^5 + 113.3232H^6 - 2711.151H^7 + 5131.661H^8$

6" Palmer-Bowlus: (a) $Q = 2.071 \times (H + .005421)^{1.9025}$ or,
(b) $Q = -0.000252012 + 0.051932H + 2.872653H^2 - 5.988129H^3 + 5.207215H^4 + 69.2287H^5 - 89.3457H^6 - 348.922H^7 + 572.806H^8$

8" Palmer-Bowlus: (a) $Q = 2.537 \times (H + .01456)^{1.9724}$ or,
(b) $Q = -0.002211174 + 0.144056H + 2.644594H^2 - 2.468403H^3 + 1.537941H^4 + 18.920840H^5 + 4.9486H^6 - 123.611H^7 + 119.943H^8$

10" Palmer-Bowlus: (a) $Q = 2.843 \times (H + .01610)^{1.9530}$ or,
(b) $Q = -0.002568036 + 0.157007H + 3.717063H^2 - 7.279155H^3 + 12.957680H^4 + 10.044620H^5 - 30.7575H^6 - 3.989H^7 + 20.724H^8$

12" Palmer-Bowlus: (a) $Q = 3.142 \times (H + .017)^{1.9362}$ or,
(b) $Q = +0.001285249 + 0.160814H + 4.074878H^2 - 4.868885H^3 + 5.194802H^4 + 5.391436H^5 - 2.3493H^6 - 15.932H^7 + 11.682H^8$

15" Palmer-Bowlus: (a) $Q = 3.574 \times (H + .01682)^{1.9062}$ or,
(b) $Q = -0.005446241 + 0.321892H + 3.703519H^2 - 1.430430H^3 + 2.165814H^4 - 10.406070H^5 + 32.1713H^6 - 36.007H^7 + 13.225H^8$

18" Palmer-Bowlus: (a) $Q = 3.988 \times (H + .01875)^{1.8977}$ or,
(b) $Q = +0.010862620 + 0.005188H + 6.702144H^2 - 7.621502H^3 + 5.159058H^4 + 3.082969H^5 - 1.4116H^6 - 3.676H^7 + 1.957H^8$

21” Palmer-Bowlus: (a) $Q = 4.223 \times (H + .039)^{1.9619}$ or,
 (b) $Q = -0.027504770 + 0.689056H + 4.144363H^2 - 1.761823H^3 + 1.672703H^4$
 $-0.342789H^5 + 1.6492H^6 - 2.110H^7 + 0.656H^8$

24” Palmer-Bowlus: (a) $Q = 4.574 \times (H + .0408)^{1.9497}$ or,
 (b) $Q = -0.002225281 + 0.420895H + 5.930978H^2 - 3.470244H^3 + 0.746696H^4 + 3.182714H^5$
 $-2.1110H^6 + 0.058H^7 + 0.141H^8$

27” Palmer-Bowlus: (a) $Q = 4.97 \times (H + .038)^{1.9269}$ or,
 (b) $Q = -0.009705140 + 0.354086H + 6.791781H^2 - 3.986792H^3 + 1.071059H^4$
 $+2.255546H^5 - 1.3530H^6 - 0.005H^7 + 0.084H^8$

30” Palmer-Bowlus: (a) $Q = 5.022 \times (H + .0625)^{1.9663}$ or,
 (b) $Q = -0.200116800 + 2.238534H + 2.207354H^2 + 1.185735H^3 + 0.374370H^4$
 $-0.386049H^5 + 0.2800H^6 - 0.168H^7 + 0.033H^8$

36” Palmer-Bowlus: (a) $Q = 5.462 \times (H + .08)^{1.991}$ or,
 (b) $Q = -0.084205270 + 1.359937H + 5.845147H^2 - 1.647873H^3 + 0.509795H^4 + 0.413952H^5$
 $-0.0570H^6 - 0.105H^7 + 0.0261H^8$

42” Palmer-Bowlus: (a) $Q = 6.12 \times (H + .078)^{1.9628}$ or,
 (b) $Q = -0.083333500 + 1.431028H + 7.047561H^2 - 2.475667H^3 + 1.037684H^4$
 $+0.102303H^5 - 0.0446H^6 - 0.035H^7 + 0.008H^8$

48” Palmer-Bowlus: (a) $Q = 6.626 \times (H + .085)^{1.9586}$ or,
 (b) $Q = -0.053395340 + 1.441452H + 7.813287H^2 - 2.012471H^3 + 0.265820H^4$
 $+0.384576H^5 - 0.0875H^6 - 0.020H^7 + 0.005H^8$

60” Palmer-Bowlus: (a) $Q = 7.183 \times (H + .126)^{1.9833}$ or,
 (b) $Q = -0.614242800 + 4.007510H + 6.591763H^2 - 1.186873H^3 + 0.318855H^4 + 0.215911H^5$
 $-0.0987H^6 + 0.012H^7 - 0.000H^8$

72” Palmer-Bowlus: (a) $Q = 7.839 \times (H + .155)^{1.9871}$ or,
 (b) $Q = -0.358481400 + 3.418848H + 8.675141H^2 - 1.269805H^3 + 0.156454H^4$
 $+0.085580H^5 - 0.0048H^6 - 0.005H^7 + 0.001H^8$