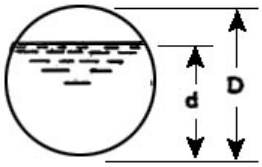
Appendix 8F-6 Velocity Head and Resistance Computations Factors for Circular Conduits Flowing Full and Partly Full

Table 3. -- Velocity head and resistance computation factors for circular conduits flowing full and partly full

Column A: Relative depth of flow, d/D
Column B: Relative velocity head
$h_v/D = \alpha V^2/2gD$, $\alpha = 1.00$, $Q/D^{2.5} = 1.0$
V = Mean flow velocity
α = Kinetic energy correction factor
g = Accel. due to gravity = 32.16 ft./sec./sec.
Column C: Resistance computation factor (K_n) for the Manning equation, $V = (1.486/n)(R)^{2/3}(S)^{1/2}$
$S_f = Q^2n^2/2.208R^{4/3}A^2 = K_n\ (n^2/D^{1/3})\ (Q/D^{2.5})^2$
$K_n = 0.4529/(R/D)^{4/3}\ (A/D^2)^2$
A = Flow area in conduit
S_f = Friction slope
R = Hydraulic radius
n = Manning coefficient
Column D: Resistance computation factor (K_f) for the Darcy equation, $h_f = (f)\ (L/4R)\ (V^2/2g)$
$S_f = Q^2f/257.28RA^2 = K_f(f)\ (Q/D^{2.5})^2$
$K_f = 0.003887/(R/D)\ (A/D^2)^2$
h_f = Friction head loss, ft.
f = Darcy coefficient
L = Length of conduit, ft.



(A) Relative depth d/D	(B) Relative velocity head $\alpha V^2/2gD$ $\alpha = 1.00$ $Q/D^{2.5} = 1.0$	(C) Manning Eq. resistance computation factor K_n	(D) Darcy Eq. resistance computation factor K_f	(A) Relative depth d/D	(B) Relative velocity head $\alpha V^2/2gD$ $\alpha = 1.00$ $Q/D^{2.5} = 1.0$	(C) Manning Eq. resistance computation factor K_n	(D) Darcy Eq. resistance computation factor K_f
1.00	0.02520	4.662	0.02520	0.85	0.03071	4.390	0.02532
0.99	.02529	4.293	.02371	.84	.03134	4.470	.02579
.98	.02544	4.174	.02326	.83	.03201	4.560	.02632
.97	.02565	4.104	.02301	.82	.03272	4.657	.02688
.96	.02589	4.061	.02288	.81	.03348	4.764	.02750
.95	.02618	4.037	.02284	.80	.03426	4.878	.02816
.94	.02648	4.028	.02287	.79	.03510	5.004	.02888
.93	.02683	4.033	.02296	.78	.03598	5.137	.02963
.92	.02720	4.046	.02310	.77	.03692	5.282	.03045
.91	.02761	4.071	.02330	.76	.03790	5.438	.03133
.90	.02805	4.105	.02353	.75	.03894	5.605	.03226
.89	.02852	4.145	.02380	.74	.04004	5.787	.03328
.88	.02902	4.195	.02412	.73	.04120	5.981	.03436
.87	.02955	4.251	.02448	.72	.04242	6.188	.03550
.86	.03011	4.317	.02487	.71	.04371	6.411	.03673

Source: