6/19/72

Calculations for Isokinetic Sampling at Dept 246

Sch 40 1/4 SS pipe Internal cross section = 0.104 in^2 = 0.722×10^{-3}

3/8 SS pipe Internal Cross-sect = 0.191 in^2 = 1.326×10^{-3}

1/2 SS pipe " " " = 0.304 in^2 = 2.111×10^{-3}

Assume 6" 153 gpm = (153)(0.1337)(1/60) = 0.341 ft^3/sec

7" 193 gpm = 0.43 "

8" 228 gpm = 0.508 "

9" 286 gpm = 0.637 "

Velocity in Sampling probe

Q = Assume 4 pump pumps 16PM = 0.0 2228 ft^3/sec

for 1/4 $V = (2.228 \times 10^{-3}) / 0.722 \times 10^{-3} = 3.09$ fps

for 3/8 $V = (2.228 \times 10^{-3}) / 1.326 \times 10^{-3} = 1.68$ fps

for 1/2 $V = (2.228 \times 10^{-3}) / 2.111 \times 10^{-3} = 1.05$ fps

	@153	@193	@228	@286
0	3.9 fps	3.94	4.24	4.82
1	3.53	3.81	3.94	4.40
2	3.12	3.37	3.49	3.89
3	2.85	3.08	3.19	3.57
4	2.62	2.83	2.93	3.27
5	2.36	2.55	2.64	2.94
6	2.19	2.37	2.45	2.73
7	2.03	2.20	2.27	2.53
8	1.89	2.05	2.12	2.36
9	1.73	1.87	1.94	2.16
10	1.63	1.76	1.82	2.02
11	1.53	1.65	1.71	1.90
12	1.41	1.53	1.58	1.76

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@ 153 gpm

				A in²	A ft²	Q/A ft/sec
0	(3.0)(4.2)	=	1	= 12.6	= 0.0875	3.9
1	(3.2)[4.2 + 1/12(6-4.2)]	=	(3.2)(4.2+0.15)	= 13.92	= 0.0967	3.5
2	(3.5)[4.2 + 2/12(6-4.2)]	=	(3.5)(4.2+0.3)	= 15.75	= 0.1094	3.1
3	(3.7)[4.2 + 3/12(1.8)]	=	(3.7)(4.2+0.45)	= 17.21	= 0.1195	2.8
4	(3.9)[4.2 + 4/12(1.8)]	=	(3.9)(4.2+0.6)	= 18.72	= 0.13	2.6
5	(4.2)[4.2 + 5/12(1.8)]	=	(4.2)(4.2+0.75)	= 20.79	= 0.1444	2.3
6	(4.4)[4.2 + 6/12(1.8)]	=	(4.4)(4.2+0.9)	= 22.44	= 0.1558	2.1
7	(4.6)[4.2 + 7/12(1.8)]	=	(4.6)(4.2+1.05)	= 24.15	= 0.1677	2.0
8	(4.8)[4.2 + 8/12(1.8)]	=	(4.8)(4.2+1.2)	= 25.92	= 0.1800	1.8
9	(5.1)[4.2 + 9/12(1.8)]	=	(5.1)(4.2+1.35)	= 28.31	= 0.1966	1.7
10	(5.3)[4.2 + 10/12(1.8)]	=	(5.3)(4.2+1.5)	= 30.21	= 0.2098	1.6
11	(5.5)[4.2 + 11/12(1.8)]	=	(5.5)(4.2+1.65)	= 32.18	= 0.2235	1.5
12	(5.8)[4.2 + 12/12(1.8)]	=	(5.8)(4.2+1.8)	= 34.80	= 0.2417	1.4

@ 193

		Area (m^2)	A (ft^2)	(ft^2/sec) Q/A
0	(3.0)(4.9) =	15.68	0.1089	3.94
1	3.2 [4.9 + 1/12 (7 − 4.9)] = (3.2)(4.9 + 0.18) =	16.26	0.1129	3.81
2	3.5 [4.9 + 2/12 (7 − 4.9)] = 3.5 (4.9 + 0.35) =	18.38	0.1276	3.37
3	3.7 [4.9 + 3/12 (7 − 4.9)] = 3.7 (4.9 + 0.53) =	20.09	0.1395	3.08
4	3.9 [4.9 + 4/12 (7 − 4.9)] = 3.9 (4.9 + 0.70) =	21.84	0.1517	2.83
5	4.2 [4.9 + 5/12 (7 − 4.9)] = 4.2 (4.9 + 0.88) =	24.28	0.1686	2.55
6	4.4 [4.9 + 6/12 (7 − 4.9)] = 4.4 (4.9 + 1.05) =	26.18	0.1818	2.37
7	4.6 [4.9 + 7/12 (7 − 4.9)] = 4.6 (4.9 + 1.23) =	28.20	0.1958	2.20
8	4.8 [4.9 + 8/12 (7 − 4.9)] = 4.8 (4.9 + 1.40) =	30.24	0.2100	2.05
9	5.1 [4.9 + 9/12 (7 − 4.9)] = 5.1 (4.9 + 1.58) =	33.05	0.2295	1.87
10	5.3 [4.9 + 10/12 (7 − 4.9)] = 5.3 (4.9 + 1.75) =	35.25	0.2448	1.76
11	5.5 [4.9 + 11/12 (7 − 4.9)] = 5.5 (4.9 + 1.93) =	37.57	0.2609	1.65
12	5.8 [4.9 + 12/12 (7 − 4.9)] = 5.8 (4.9 + 2.1) =	40.60	0.2819	1.53

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@ 228 gpm

			A (ft^2)	A (ft^2)	(q/600) q/A
0	(3.0)(5.59)	=	16.77	0.1165	4.36
1	3.2 [5.59 + 1/12 (8 − 5.59)]	= 3.2 (5.59 0.20)	= 18.53	0.1287	3.94
2	3.5 [5.59 + 2/12 (2.41)]	= 3.5 (5.59 0.40	= 20.97	0.1456	3.49
3	3.7 [5.59 + 3/12 (2.41]	= 3.7 (5.59 0.60	= 22.90	0.1590	3.19
4	3.9 [5.59 + 4/12 (2.41]	= 3.9 (5.59 0.80	= 24.92	0.1731	2.93
5	4.2 [5.59 + 5/12 (2.41)]	= 4.2 (5.59 1.00	= 27.68	0.1922	2.64
6	4.4 [5.59 + 6/12 (2.41)]	= 4.4 (5.59 1.20	= 29.88	0.2075	2.45
7	4.6 [5.59 + 7/12 (2.41)]	= 4.6 (5.59 1.41	= 32.20	0.2236	2.27
8	4.8 [5.59 + 8/12 (2.41)]	= 4.8 (5.59 1.61	= 34.56	0.2400	2.12
9	5.1 [5.59 + 9/12 (2.41)]	= 5.1 (5.59 1.81	= 37.74	0.2621	1.94
10	5.3 [5.59 + 10/12 (2.41)]	= 5.3 (5.59 2.01	= 40.28	0.2797	1.82
11	5.5 [5.59 + 11/12 (2.41)]	= 5.5 (5.59 2.21	= 42.90	0.2979	1.71
12	5.8 [5.59 + 12/12 (2.41)]	= 5.8 (5.59 + 2.41)	= 46.40	0.3222	1.58

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@ 2EC span

			A (m^2)	A (ft^2)	#/lace ft
0	(3.0)(6.29)	=	18.87	0.1310	4.82
1	3.2 [6.29 + 4/12 (9.-6.29)]	= 3.2 (6.29+0.23)	20.86	0.1449	4.40
2	3.5 [6.29 + 2/12 (2.71)]	= 3.5 (6.29+0.45)	23.59	0.1638	3.89
3	3.7 [6.29 + 3/12 (2.71)]	= 3.7 (6.29+0.66)	25.72	0.1786	3.57
4	3.9 [6.29 + 4/12 (2.71)]	= 3.9 (6.29+0.90)	28.04	0.1947	3.27
5	4.2 [6.29 + 5/12 (2.71)]	= 4.2 (6.29+1.13)	31.16	0.2164	2.94
6	4.4 [6.29 + 6/12 (2.71)]	= 4.4 (6.29+1.36)	33.66	0.2337	2.73
7	4.6 [6.29 + 7/12 (2.71)]	= 4.6 (6.29+1.58)	36.20	0.2514	2.53
8	4.8 [6.29 + 8/12 (2.71)]	= 4.8 (6.29+1.81)	38.88	0.2700	2.36
9	5.1 [6.29 + 9/12 (2.71)]	= 5.1 (6.29+2.03)	42.43	0.2947	2.16
10	5.3 [6.29 + 10/12 (2.71)]	= 5.3 (6.29+2.26)	45.32	0.3147	2.02
11	5.5 [6.29 + 11/12 (2.71)]	= 5.5 (6.29+2.49)	48.29	0.3353	1.90
12	5.8 [6.29 + 12/12 (2.71)]	= 5.8 (6.29+2.71)	52.20	0.3625	1.76

DSW 296002

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