Water Main Flushing and Pressure Testing

Flushing

Before being chlorinated, the water main should be filled to eliminate air pockets and should be flushed to remove particulates. The flushing velocity in the main should be no less than 2.5 ft/sec. unless the engineer or job superintendent determines that conditions do not permit the required flow to be discharged to waste. The table to the right shows the rates of flow required to produce a velocity of 2.5 ft/sec. in pipes of various sizes. Flushing is no substitute for preventive measures during construction. Certain contaminants, such as caked deposits, resist flushing at any feasible velocity.

In mains of 24" or larger diameter, an acceptable alternative to flushing is to broom-sweep the main, carefully removing all sweepings prior to chlorinating the main.

REQUIRED FLOW and OPENINGS to FLUSH PIPELINES (40 psi residual pressure in water main)*					
PIPE SIZE	FLOW REQUIRED TO PRODUCE 2.5 ft/s (approx.) VELOCITY IN MAIN	SIZE OF TAP (inches)			NUMBER OF 2.5" HYDRANT OUTLETS*
		1"	1.5"	2"	
		NUMBER OF TAPS ON PIPE †			
4"	100 gpm	1	—	—	1
6"	200 gpm	—	1	—	1
8"	400 gpm	—	2	1	1
10"	600 gpm	—	3	2	1
12"	900 gpm	—	—	2	2
16"	1600 gpm	—	—	4	2

* With a 40-psi pressure in the main with the hydrant flowing to atmosphere, a 2½" hydrant outlet will discharge approximately 1000 gpm and a 4½" hydrant outlet will discharge approximately 2500 gpm.

† Number of taps on pipe based on discharge through 5' of galvanized pipe with one 90° elbow.

Pressure Testing

Allowable Leakage Loss Formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:
- L = Allowable leakage, in gallons per hour.
- S = Length of pipe tested, in feet.
- D = Nominal diameter of the pipe, in inches.
- P = Average test pressure during the leakage test, in pounds per square inch (gauge).

ALLOWABLE LEAKAGE PER 1000 FEET OF PIPELINE* — GPH (GALLONS PER HOUR)																	
AVERAGE TEST PRESSURE		NOMINAL PIPE DIAMETER (INCHES)															
PSI	BAR	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450	31	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400	28	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350	24	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300	21	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275	19	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250	17	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	16	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200	14	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	12	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	10	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125	9	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	7	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

BAR= A metric unit of pressure = 10^5n/sq. meter.
Atmospheric pressure @ sea level = 14.7 #/sq. inch.
Example: 450 lbs. per sq. inch ÷ 14.7 #/sq. inch = 31 BARS.

* If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

NOTE: When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. of nominal valve size shall be allowed.