

Head Losses in Ordinary Steel Water Pipes

Higher figures indicate the velocity of water in m/sec.

Lower figures indicate head in metres per 100 metres of straight pipes.

Quantity of Water			Head Losses in Ordinary Water Pipes											
m ³ /h	Litres/min.	Litres/sec.	Nominal Pipe Diameter in Inches and Internal Diameter in (mm)											
			½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	5"	6"
			15.75	21.25	27.00	35.75	41.25	52.50	68.00	80.25	92.50	105.0	130.0	155.5
0.6	10	0.16	0.855	0.470	0.292									
			9.910	2.407	0.784									
0.9	15	0.25	1.282	0.705	0.438	0.249								
			20.11	4.862	1.570	0.416								
1.2	20	0.33	1.710	0.940	0.584	0.331	0.249							
			33.53	8.035	2.588	0.677	0.346							
1.5	25	0.42	2.138	1.174	0.730	0.415	0.312							
			49.93	11.91	3.834	1.004	0.510							
1.8	30	0.50	2.565	1.409	0.876	0.498	0.374	0.231						
			69.34	16.50	5.277	1.379	0.700	0.223						
2.1	35	0.58	2.993	1.644	1.022	0.581	0.436	0.269						
			91.54	21.75	6.949	1.811	0.914	0.291						
2.4	40	0.67		1.879	1.168	0.664	0.499	0.308						
				27.66	8.820	2.290	1.160	0.368						
3.0	50	0.83		2.349	1.460	0.830	0.623	0.385	0.229					
				41.40	13.14	3.403	1.719	0.544	0.159					
3.6	60	1.00		2.819	1.751	0.996	0.748	0.462	0.275					
				57.74	18.28	4.718	2.375	0.751	0.218					
4.2	70	1.12		3.288	2.043	1.162	0.873	0.539	0.321	0.231				
				76.49	24.18	6.231	3.132	0.988	0.287	0.131				
4.8	80	1.33			2.335	1.328	0.997	0.616	0.367	0.263				
					30.87	7.940	3.988	1.254	0.363	0.164				
5.4	90	1.50			2.627	1.494	1.122	0.693	0.413	0.269				
					38.30	9.828	4.927	1.551	0.449	0.203				
6.0	100	1.67			2.919	1.660	1.247	0.770	0.459	0.329	0.248			
					46.49	11.90	5.972	1.875	0.542	0.244	0.124			
7.5	125	2.08			3.649	2.075	1.558	0.962	0.574	0.412	0.310	0.241		
					70.41	17.93	8.967	2.802	0.809	0.365	0.185	0.101		
9.0	150	2.50			2.490	1.870	1.154	0.668	0.494	0.372	0.289			
						25.11	12.53	3.903	1.124	0.506	0.256	0.140		
10.5	175	2.92			2.904	2.182	1.347	0.803	0.576	0.434	0.337			
						33.32	16.66	5.179	1.488	0.670	0.338	0.184		
12	200	3.33			3.319	2.493	1.539	0.918	0.659	0.496	0.385	0.251		
					42.75	21.36	6.624	1.901	0.855	0.431	0.234	0.084		
15	250	4.17			4.149	3.117	1.924	1.147	0.823	0.620	0.481	0.314		
					64.86	32.32	10.03	2.860	1.282	0.646	0.350	0.126		
18	300	5.00			3.740	2.309	1.377	0.988	0.744	0.577	0.377	0.263		
						45.52	14.04	4.009	1.792	0.903	0.488	0.175	0.074	
24	400	6.67			4.987	3.078	1.836	1.317	0.992	0.770	0.502	0.351		
						78.17	24.04	6.828	3.053	1.530	0.829	0.294	0.124	
30	500	8.33			3.848	2.295	1.647	1.240	0.962	0.628	0.439			
						36.71	10.40	4.622	2.315	1.254	0.445	0.187		
36	600	10.0			46.18	2.753	1.976	1.488	1.155	0.753	0.526			
						51.84	14.62	6.505	3.261	1.757	0.623	0.260		
42	700	11.7						3.212	2.306	1.736	1.347	0.879	0.614	
								19.52	8.693	4.356	2.345	0.831	0.347	
48	800	13.3						3.671	2.635	1.984	1.540	1.005	0.702	
								25.20	11.18	5.582	3.009	1.066	0.445	
54	900	15.0						4.130	2.964	2.232	1.732	1.130	0.790	
								31.51	13.97	6.983	3.762	1.328	0.555	
60	1000	16.7						4.589	3.294	2.480	1.925	1.256	0.877	
								38.43	17.06	8.521	4.595	1.616	0.674	
75	1250	20.8							4.117	3.100	2.406	1.570	1.097	
									26.10	13.00	7.010	2.458	1.027	
90	1500	25.0							4.941	3.720	2.887	1.883	1.316	
									36.97	18.42	9.892	3.458	1.444	
105	1750	29.2								4.340	3.368	1.883	1.535	
										24.76	13.30	3.468	1.934	
120	2000	33.3								4.960	3.850	2.197	1.754	
										31.94	17.16	4.665	2.496	
150	2500	41.7									4.812	2.511	2.193	
											26.26	5.995	3.807	
180	3000	50.0										3.139	2.632	
												9.216	5.417	
240	4000	66.7										3.767	3.509	
												13.05	8.926	
300	5000	83.3										5.523	4.386	
												22.72	14.42	
90°C bends slide valves			1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.7	2.5
T-pieces, non-return valves			4.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	7.0	9.0

The table is calculated in accordance with H. Lang's new formula $a=0.02$ for a water temperature of 10°C.

The head loss in bends, slide valves, T-pieces and non-return valves is equivalent to the metres of straight pipes stated in the last two lines of the table. To find the head loss in foot valves, multiply the loss in T-pieces by two.