

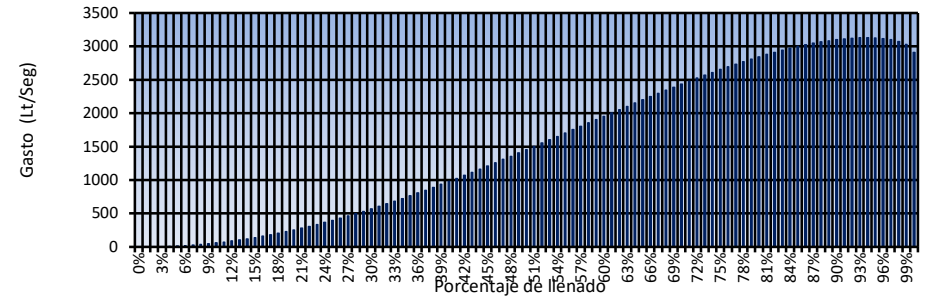
# COMPORTAMIENTO HIDRAULICO

## TUBERIA A PRESIÓN ATMOSFÉRICA

### FORMULA DE MANNING

PROYECTO :								
TRAMO :								
FECHA :			ELABORO :					
Número Manning (n) =		0.009						
Pendiente del tubo (S) =		0.0050 m / m						
Diámetro (D) =		42 inch		1.0668 m				
radio=		21 inch		0.5334 m				
Area de tubo Ac=		1385.442 in^2		0.89383 m2				
Tirante (m)	% llenado	Q (Lt/Seg)	Velocidad m/seg	$\alpha$	n mínimo	A (m2)	R (m)	EFICIENCIA
0.0107	1%	0.44	0.29	0.20033	n=0.012	0.0015	0.0071	0.0%
0.0213	2%	1.96	0.46	0.28379	n=0.012	0.0043	0.0141	0.1%
0.0320	3%	4.68	0.60	0.34817	n=0.012	0.0078	0.0210	0.1%
0.0427	4%	8.67	0.72	0.40272	n=0.010	0.0120	0.0279	0.3%
<b>0.0533</b>	<b>5%</b>	<b>13.97</b>	<b>0.84</b>	0.45103	n=0.010	0.0167	0.0347	0.4%
0.0640	6%	20.61	0.94	0.49493	n=0.010	0.0219	0.0415	0.7%
0.0747	7%	28.60	1.04	0.53553	n=0.010	0.0275	0.0481	0.9%
0.0853	8%	37.95	1.13	0.57351	n=0.010	0.0335	0.0548	1.2%
0.0960	9%	48.67	1.22	0.60939	n=0.010	0.0398	0.0613	1.6%
<b>0.1067</b>	<b>10%</b>	<b>60.75</b>	<b>1.31</b>	0.64350	n=0.010	0.0465	0.0678	1.9%
0.1173	11%	74.19	1.39	0.67613	n=0.010	0.0535	0.0742	2.4%
0.1280	12%	88.99	1.46	0.70748	n=0.010	0.0608	0.0805	2.8%
0.1387	13%	105.14	1.54	0.73773	n=0.010	0.0683	0.0868	3.4%
0.1494	14%	122.63	1.61	0.76699	n=0.010	0.0761	0.0930	3.9%
<b>0.1600</b>	<b>15%</b>	<b>141.44</b>	<b>1.68</b>	0.79540	n=0.010	0.0841	0.0991	4.5%
0.1707	16%	161.56	1.75	0.82303	n=0.010	0.0923	0.1051	5.2%
0.1814	17%	182.97	1.82	0.84998	n=0.010	0.1008	0.1111	5.8%
0.1920	18%	205.67	1.88	0.87630	n=0.010	0.1094	0.1170	6.6%
0.2027	19%	229.62	1.94	0.90205	n=0.010	0.1182	0.1229	7.3%
<b>0.2134</b>	<b>20%</b>	<b>254.81</b>	<b>2.00</b>	0.92730	n=0.010	0.1273	0.1286	8.1%
0.2240	21%	281.21	2.06	0.95207	n=0.010	0.1365	0.1343	9.0%
0.2347	22%	308.82	2.12	0.97641	n=0.010	0.1458	0.1400	9.9%
0.2454	23%	337.59	2.17	1.00036	n=0.010	0.1553	0.1455	10.8%
0.2560	24%	367.52	2.23	1.02395	n=0.010	0.1650	0.1510	11.7%
<b>0.2667</b>	<b>25%</b>	<b>398.57</b>	<b>2.28</b>	1.04720	n=0.010	0.1747	0.1564	12.7%
0.2774	26%	430.73	2.33	1.07014	n=0.010	0.1847	0.1618	13.8%
0.2880	27%	463.95	2.38	1.09280	n=0.010	0.1947	0.1670	14.8%
0.2987	28%	498.23	2.43	1.11520	n=0.010	0.2049	0.1722	15.9%
0.3094	29%	533.52	2.48	1.13735	n=0.009	0.2151	0.1773	17.0%
<b>0.3200</b>	<b>30%</b>	<b>569.81</b>	<b>2.53</b>	1.15928	n=0.009	0.2255	0.1824	18.2%
0.3307	31%	607.06	2.57	1.18100	n=0.009	0.2360	0.1873	19.4%
0.3414	32%	645.24	2.62	1.20253	n=0.009	0.2466	0.1922	20.6%
0.3520	33%	684.32	2.66	1.22388	n=0.009	0.2572	0.1970	21.9%
0.3627	34%	724.28	2.70	1.24507	n=0.009	0.2680	0.2018	23.1%
<b>0.3734</b>	<b>35%</b>	<b>765.07</b>	<b>2.74</b>	1.26610	n=0.009	0.2788	0.2064	24.4%
0.3840	36%	806.68	2.78	1.28700	n=0.009	0.2897	0.2110	25.8%
0.3947	37%	849.06	2.82	1.30777	n=0.009	0.3007	0.2155	27.1%
0.4054	38%	892.19	2.86	1.32843	n=0.009	0.3117	0.2199	28.5%
0.4161	39%	936.02	2.90	1.34898	n=0.009	0.3227	0.2243	29.9%
<b>0.4267</b>	<b>40%</b>	<b>980.53</b>	<b>2.94</b>	1.36944	n=0.009	0.3339	0.2285	31.3%
0.4374	41%	1025.68	2.97	1.38981	n=0.009	0.3450	0.2327	32.8%
0.4481	42%	1071.44	3.01	1.41011	n=0.009	0.3563	0.2368	34.2%
0.4587	43%	1117.76	3.04	1.43033	n=0.009	0.3675	0.2409	35.7%
0.4694	44%	1164.62	3.07	1.45051	n=0.009	0.3788	0.2448	37.2%
<b>0.4801</b>	<b>45%</b>	<b>1211.97</b>	<b>3.11</b>	1.47063	n=0.009	0.3901	0.2487	38.7%
0.4907	46%	1259.79	3.14	1.49071	n=0.009	0.4014	0.2524	40.3%
0.5014	47%	1308.02	3.17	1.51076	n=0.009	0.4128	0.2561	41.8%
0.5121	48%	1356.63	3.20	1.53079	n=0.009	0.4242	0.2597	43.3%

### Gasto / Tirante hidráulico



0.5227	49%	1405.59	3.23	1.55079	n=0.009	0.4355	0.2633	44.9%
<b>0.5334</b>	<b>50%</b>	<b>1454.85</b>	<b>3.26</b>	1.57080	n=0.009	0.4469	0.2667	46.5%
0.5441	51%	1504.37	3.28	1.59080	n=0.009	0.4583	0.2701	48.1%
0.5547	52%	1554.11	3.31	1.61081	n=0.009	0.4697	0.2733	49.7%
0.5654	53%	1604.03	3.33	1.63083	n=0.009	0.4810	0.2765	51.2%
0.5761	54%	1654.09	3.36	1.65088	n=0.009	0.4924	0.2796	52.8%
<b>0.5867</b>	<b>55%</b>	<b>1704.24</b>	<b>3.38</b>	1.67096	n=0.009	0.5037	0.2826	54.5%
0.5974	56%	1754.44	3.41	1.69109	n=0.009	0.5150	0.2855	56.1%
0.6081	57%	1804.65	3.43	1.71126	n=0.009	0.5263	0.2883	57.7%
0.6187	58%	1854.82	3.45	1.73149	n=0.009	0.5376	0.2910	59.3%
0.6294	59%	1904.90	3.47	1.75178	n=0.009	0.5488	0.2937	60.9%
<b>0.6401</b>	<b>60%</b>	<b>1954.85</b>	<b>3.49</b>	1.77215	n=0.009	0.5600	0.2962	62.5%
0.6507	61%	2004.62	3.51	1.79261	n=0.009	0.5711	0.2986	64.0%
0.6614	62%	2054.16	3.53	1.81316	n=0.009	0.5822	0.3010	65.6%
0.6721	63%	2103.42	3.55	1.83382	n=0.009	0.5932	0.3032	67.2%
0.6828	64%	2152.36	3.56	1.85459	n=0.009	0.6041	0.3054	68.8%
<b>0.6934</b>	<b>65%</b>	<b>2200.92</b>	<b>3.58</b>	1.87549	n=0.009	0.6150	0.3074	70.3%
0.7041	66%	2249.04	3.59	1.89653	n=0.009	0.6258	0.3093	71.9%
0.7148	67%	2296.67	3.61	1.91771	n=0.009	0.6366	0.3112	73.4%
0.7254	68%	2343.77	3.62	1.93906	n=0.009	0.6473	0.3129	74.9%
0.7361	69%	2390.27	3.63	1.96059	n=0.009	0.6578	0.3145	76.4%
<b>0.7468</b>	<b>70%</b>	<b>2436.10</b>	<b>3.65</b>	1.98231	n=0.009	0.6683	0.3160	77.8%
0.7574	71%	2481.23	3.66	2.00424	n=0.009	0.6787	0.3174	79.3%
0.7681	72%	2525.57	3.67	2.02640	n=0.009	0.6890	0.3187	80.7%
0.7788	73%	2569.07	3.67	2.04879	n=0.009	0.6991	0.3199	82.1%
0.7894	74%	2611.67	3.68	2.07145	n=0.009	0.7092	0.3209	83.4%
<b>0.8001</b>	<b>75%</b>	<b>2653.28</b>	<b>3.69</b>	2.09440	n=0.009	0.7191	0.3218	84.8%
0.8108	76%	2693.85	3.70	2.11765	n=0.009	0.7289	0.3226	86.1%
0.8214	77%	2733.30	3.70	2.14123	n=0.009	0.7385	0.3233	87.3%
0.8321	78%	2771.55	3.71	2.16518	n=0.009	0.7480	0.3238	88.6%
0.8428	79%	2808.52	3.71	2.18953	n=0.009	0.7574	0.3243	89.7%
<b>0.8534</b>	<b>80%</b>	<b>2844.13</b>	<b>3.71</b>	2.21430	n=0.009	0.7666	0.3245	90.9%
0.8641	81%	2878.28	3.71	2.23954	n=0.009	0.7756	0.3246	92.0%
0.8748	82%	2910.87	3.71	2.26529	n=0.009	0.7844	0.3246	93.0%
0.8854	83%	2941.81	3.71	2.29162	n=0.009	0.7931	0.3244	94.0%
0.8961	84%	2970.98	3.71	2.31856	n=0.009	0.8015	0.3241	94.9%
<b>0.9068</b>	<b>85%</b>	<b>2998.26</b>	<b>3.70</b>	2.34619	n=0.009	0.8098	0.3235	95.8%
0.9174	86%	3023.53	3.70	2.37460	n=0.009	0.8178	0.3228	96.6%
0.9281	87%	3046.62	3.69	2.40387	n=0.009	0.8255	0.3219	97.3%
0.9388	88%	3067.38	3.68	2.43411	n=0.009	0.8331	0.3208	98.0%
0.9495	89%	3085.63	3.67	2.46546	n=0.009	0.8403	0.3195	98.6%
<b>0.9601</b>	<b>90%</b>	<b>3101.14</b>	<b>3.66</b>	2.49809	n=0.009	0.8473	0.3179	99.1%
0.9708	91%	3113.67	3.65	2.53221	n=0.009	0.8540	0.3161	99.5%
0.9815	92%	3122.91	3.63	2.56808	n=0.009	0.8603	0.3140	99.8%
0.9921	93%	3128.48	3.61	2.60607	n=0.009	0.8663	0.3116	100.0%
<b>1.0028</b>	<b>94%</b>	<b>3129.90</b>	<b>3.59</b>	2.64666	n=0.009	0.8719	0.3088	100.0%
<b>1.0135</b>	<b>95%</b>	<b>3126.51</b>	<b>3.56</b>	2.69057	n=0.009	0.8771	0.3056	99.9%
1.0241	96%	3117.37	3.54	2.73888	n=0.009	0.8818	0.3018	99.6%
1.0348	97%	3100.99	3.50	2.79343	n=0.009	0.8860	0.2973	99.1%
1.0455	98%	3074.65	3.46	2.85780	n=0.009	0.8896	0.2918	98.2%
1.0561	99%	3031.79	3.40	2.94126	n=0.009	0.8923	0.2844	96.9%
<b>1.0668</b>	<b>100%</b>	<b>2909.69</b>	<b>3.26</b>	3.14159	n=0.009	0.8938	0.2667	93.0%

El 80 % Se considera la capacidad máxima para conducir el flujo a presión atmosférica

0.00742082

Esta es la capacidad máxima de la tubería y donde alcanza su mayor eficiencia de conducción (ya se considera tubería a presión).