

Ausflussmengen aus runden und scharfkantigen Öffnungen in atmosphärische Umgebung (Luft oder Freispiegelleitung)

Stand: 06.03.2019

Öffnung rund scharfkantig [mm]	Vordruck in bar							Vordruck in Meter			
	4.0 [l/min]	5.0 [l/min]	6.0 [l/min]	7.0 [l/min]	8.0 [l/min]	9.0 [l/min]	10.0 [l/min]	1.00 [l/min]	0.80 [l/min]	0.60 [l/min]	0.40 [l/min]
1	0.8	0.9	1.0	1.1	1.1	1.2	1.3	0.13	0.11	0.10	0.08
2	3.2	3.6	3.9	4.2	4.5	4.8	5.1	0.50	0.45	0.39	0.32
3	7.2	8.0	8.8	9.5	10.2	10.8	11.4	1.13	1.01	0.87	0.71
4	12.8	14.3	15.7	16.9	18.1	19.2	20.2	2.00	1.79	1.55	1.27
5	20.0	22.4	24.5	26.4	28.3	30.0	31.6	3.13	2.80	2.42	1.98
6	28.8	32.2	35.3	38.1	40.7	43.2	45.5	4.51	4.03	3.49	2.85
7	39.2	43.8	48.0	51.8	55.4	58.8	62.0	6.14	5.49	4.75	3.88
8	51.2	57.2	62.7	67.7	72.4	76.8	80.9	8.01	7.17	6.21	5.07
9	64.8	72.4	79.3	85.7	91.6	97.2	102.4	10.14	9.07	7.86	6.41
10	80.0	89.4	97.9	105.8	113.1	120.0	126.4	12.52	11.20	9.70	7.92
11	97	108	119	128	137	145	153	15.2	13.6	11.7	9.6
12	115	129	141	152	163	173	182	18.0	16.1	14.0	11.4
13	135	151	166	179	191	203	214	21.2	18.9	16.4	13.4
14	157	175	192	207	222	235	248	24.5	22.0	19.0	15.5
15	180	201	220	238	254	270	285	28.2	25.2	21.8	17.8
16	205	229	251	271	290	307	324	32.1	28.7	24.8	20.3
17	231	258	283	306	327	347	365	36.2	32.4	28.0	22.9
18	259	290	317	343	366	389	410	40.6	36.3	31.4	25.7
19	289	323	354	382	408	433	456	45.2	40.4	35.0	28.6
20	320	358	392	423	452	480	506	50.1	44.8	38.8	31.7
21	353	394	432	467	499	529	558	55.2	49.4	42.8	34.9
22	387	433	474	512	547	581	612	60.6	54.2	46.9	38.3
23	423	473	518	560	598	635	669	66.2	59.2	51.3	41.9
24	461	515	564	609	651	691	728	72.1	64.5	55.9	45.6
25	500	559	612	661	707	750	790	78.3	70.0	60.6	49.5
26	541	604	662	715	765	811	855	84.6	75.7	65.6	53.5
27	583	652	714	771	824	874	922	91.3	81.6	70.7	57.7
28	627	701	768	829	887	940	991	98.2	87.8	76.0	62.1
29	673	752	824	890	951	1'009	1'063	105.3	94.2	81.6	66.6
30	720	805	882	952	1'018	1'080	1'138	112.7	100.8	87.3	71.3
31	769	859	941	1'017	1'087	1'153	1'215	120.3	107.6	93.2	76.1
32	819	916	1'003	1'083	1'158	1'228	1'295	128.2	114.7	99.3	81.1
33	871	974	1'067	1'152	1'232	1'306	1'377	136.4	122.0	105.6	86.2
34	924	1'034	1'132	1'223	1'307	1'387	1'462	144.8	129.5	112.1	91.5
35	980	1'095	1'200	1'296	1'385	1'469	1'549	153.4	137.2	118.8	97.0
36	1'036	1'159	1'269	1'371	1'466	1'555	1'639	162.3	145.2	125.7	102.6
37	1'095	1'224	1'341	1'448	1'548	1'642	1'731	171.4	153.3	132.8	108.4
38	1'155	1'291	1'414	1'528	1'633	1'732	1'826	180.8	161.7	140.1	114.4
39	1'216	1'360	1'490	1'609	1'720	1'825	1'923	190.5	170.3	147.5	120.5
40	1'280	1'431	1'567	1'693	1'810	1'919	2'023	200.3	179.2	155.2	126.7
41	1'344	1'503	1'646	1'778	1'901	2'016	2'126	210.5	188.3	163.0	133.1
42	1'411	1'577	1'728	1'866	1'995	2'116	2'231	220.9	197.6	171.1	139.7
43	1'479	1'653	1'811	1'956	2'091	2'218	2'338	231.5	207.1	179.3	146.4
44	1'548	1'731	1'896	2'048	2'190	2'322	2'448	242.4	216.8	187.8	153.3
45	1'619	1'811	1'983	2'142	2'290	2'429	2'561	253.6	226.8	196.4	160.4
46	1'692	1'892	2'073	2'239	2'393	2'538	2'676	265.0	237.0	205.2	167.6
47	1'767	1'975	2'164	2'337	2'498	2'650	2'793	276.6	247.4	214.3	174.9
48	1'843	2'060	2'257	2'437	2'606	2'764	2'913	288.5	258.0	223.5	182.5
49	1'920	2'147	2'352	2'540	2'715	2'880	3'036	300.6	268.9	232.9	190.1
50	1'999	2'235	2'449	2'645	2'827	2'999	3'161	313.0	280.0	242.5	198.0
52	2'162	2'418	2'648	2'861	3'058	3'244	3'419	338.6	302.8	262.3	214.1
54	2'332	2'607	2'856	3'085	3'298	3'498	3'687	365.1	326.6	282.8	230.9
56	2'508	2'804	3'072	3'318	3'547	3'762	3'965	392.7	351.2	304.2	248.4
58	2'690	3'008	3'295	3'559	3'805	4'035	4'254	421.2	376.8	326.3	266.4
60	2'879	3'219	3'526	3'809	4'072	4'318	4'552	450.8	403.2	349.2	285.1
62	3'074	3'437	3'765	4'067	4'347	4'611	4'861	481.3	430.5	372.8	304.4
64	3'276	3'662	4'012	4'333	4'632	4'913	5'179	512.9	458.7	397.3	324.4
66	3'484	3'895	4'266	4'608	4'927	5'225	5'508	545.5	487.9	422.5	345.0
68	3'698	4'134	4'529	4'892	5'230	5'547	5'847	579.0	517.9	448.5	366.2
70	3'919	4'381	4'799	5'184	5'542	5'878	6'196	613.6	548.8	475.3	388.1
72	4'146	4'635	5'077	5'484	5'863	6'219	6'555	649.1	580.6	502.8	410.5
74	4'379	4'896	5'363	5'793	6'193	6'569	6'924	685.7	613.3	531.1	433.7
76	4'619	5'164	5'657	6'111	6'533	6'929	7'304	723.3	646.9	560.2	457.4
78	4'865	5'440	5'959	6'436	6'881	7'298	7'693	761.8	681.4	590.1	481.8
80	5'118	5'722	6'268	6'771	7'238	7'677	8'093	801.4	716.8	620.8	506.8
82	5'377	6'012	6'586	7'114	7'605	8'066	8'502	842.0	753.1	652.2	532.5
84	5'643	6'309	6'911	7'465	7'980	8'464	8'922	883.5	790.3	684.4	558.8
86	5'915	6'613	7'244	7'824	8'365	8'872	9'352	926.1	828.3	717.4	585.7
88	6'193	6'924	7'585	8'193	8'758	9'290	9'792	969.7	867.3	751.1	613.3
90	6'478	7'242	7'934	8'569	9'161	9'717	10'242	1'014.3	907.2	785.6	641.5
92	6'769	7'568	8'290	8'954	9'573	10'153	10'702	1'059.8	948.0	821.0	670.3
94	7'066	7'900	8'654	9'348	9'993	10'599	11'173	1'106.4	989.6	857.0	699.8
96	7'370	8'240	9'027	9'750	10'423	11'055	11'653	1'154.0	1'032.2	893.9	729.9
98	7'681	8'587	9'407	10'160	10'862	11'521	12'144	1'202.6	1'075.6	931.5	760.6
100	7'997	8'941	9'795	10'579	11'310	11'996	12'645	1'252.2	1'120.0	969.9	791.9

$$Q = \mu x F x \sqrt{2 g h}$$

Q: Ausfluss durch Öffnung in m³/s
 μ: Kontraktionsfaktor, scharfkantig ~ 0.6, ausreichend ausgerundet = 1.0
 F: Fläche der Öffnung in m²

g: Erdbeschleunigung 9.81 m/s²
 h: Vordruck bzw. Stauhöhe in m