4. Viscosity

Higher viscosity of a liquid results in strong droplets cohesion. Therefore, more pressure is needed to atomize the liquid. However, the influence of viscosity is very complex. Under certain circumstances, higher viscosity can increase the flow rate even though the pressure remains constant. Sometimes the opposite can be the case. The actual effect has to be determined for every nozzle under its special operating conditions.

5. Surface tension

In order to create droplets, not only viscosity forces have to be overcome but also surface tension. In contrast to viscosity, however, surface tension doesn’t have such a strong effect. Still, it is a codetermination factor in the formation of droplets, since it only changes slightly. Increased surface tension causes the droplet, formed through liquid atomization, to be more cohesive. The results are larger droplets.

6. Temperature

All information throughout this catalog refer to a water temperature of 21°C. Nozzle features don’t change when the temperature is changing. Yet, temperature changes have an effect on a medium‘s viscosity, surface tension and specific gravity. These, in turn, change the spray data.

7. Spray angle and spray width

The theoretical spray width B is listed in illustration 1. It depends on the spray medium of water, the spray angle and the spray distance H.
To calculate the theoretical spray width B for spray distances H not listed in the chart below (illustration 1), multiply the distance your require with the factor B/H.

Illu. 1

Spray angle	Factor B/H	Theoretical spray width B in (cm) for varying spray distances H in (cm)									
		5 cm	10 cm	15 cm	20 cm	30 cm	40 cm	60 cm	80 cm	100 cm	150 cm
5°	0.087	0.4	0.9	1.3	1.7	2.6	3.5	5.2	7.0	8.7	13.1
10°	0.175	0.9	1.7	2.6	3.5	5.2	7.0	10.5	14.0	17.5	26
15°	0.263	1.3	2.6	3.9	5.3	7.9	10.5	15.8	21	26	39
20°	0.353	1.8	3.5	5.3	7.1	10.6	14.1	21	28	35	53
25°	0.443	2.2	4.4	6.6	8.9	13.3	17.7	27	35	44	66
30°	0.536	2.7	5.4	8.0	10.7	16.1	21	32	43	54	80
35°	0.630	3.2	6.3	9.5	12.6	18.9	25	38	50	63	95
40°	0.728	3.6	7.3	10.9	14.6	22	29	44	58	73	109
45°	0.828	4.1	8.3	12.4	16.6	25	33	50	66	83	124
50°	0.932	1.7	9.3	14.0	18.6	28	37	56	75	93	140
55°	1.04	5.2	10.4	15.6	21	31	42	62	83	104	156
60°	1.15	5.8	11.5	17.3	23	35	46	69	92	115	173
65°	1.27	6.4	12.7	19.1	25	38	51	76	102	127	191
70°	1.40	7.0	14.0	21	28	42	56	84	112	140	210
75°	1.53	7.7	15.3	23	31	46	61	92	123	153	230
80°	1.68	8.4	16.8	25	34	50	67	101	134	168	252
85°	1.83	9.2	18.3	27	37	55	73	110	147	183	275
90°	2.00	10.0	20	30	40	60	80	120	160	200	300
95°	2.18	10.9	22	33	44	65	87	131	175	218	327
100°	2.38	11.9	24	36	48	71	95	143	191	238	357
110°	2.86	14.3	29	43	57	86	114	171	228	286	428
120°	3.46	17.3	35	52	69	104	139	208	277	346	519
130°	4.29	21	43	64	86	129	171	257	343	429	643
140°	5.49	27	55	82	110	165	220	329	439	549	824
150°	7.46	37	75	112	149	224	298	447	597	746	1,119

Effective spray width B x

In practice, the resulting spray width (- surface) does not change in a linear way with regard to its distance when spraying with a fixed spray angle. As illustration 2 shows, gravity and gas friction start to affect the spray angle and cause it to slide off sideways.

- The spray angle is reduced for very high pressure ratios since the axial velocity component increases more than the deflection component.
- Low pressure ratios or larger spray ratios cause the spray angle to slide off sideways.
- The spray angle of liquids more viscous than water will be smaller. Liquids with a lower surface tension than water will increase the spray angle.
- Critical requirements should be treated individually with regards to the special needs of the user.

Illu. 2