

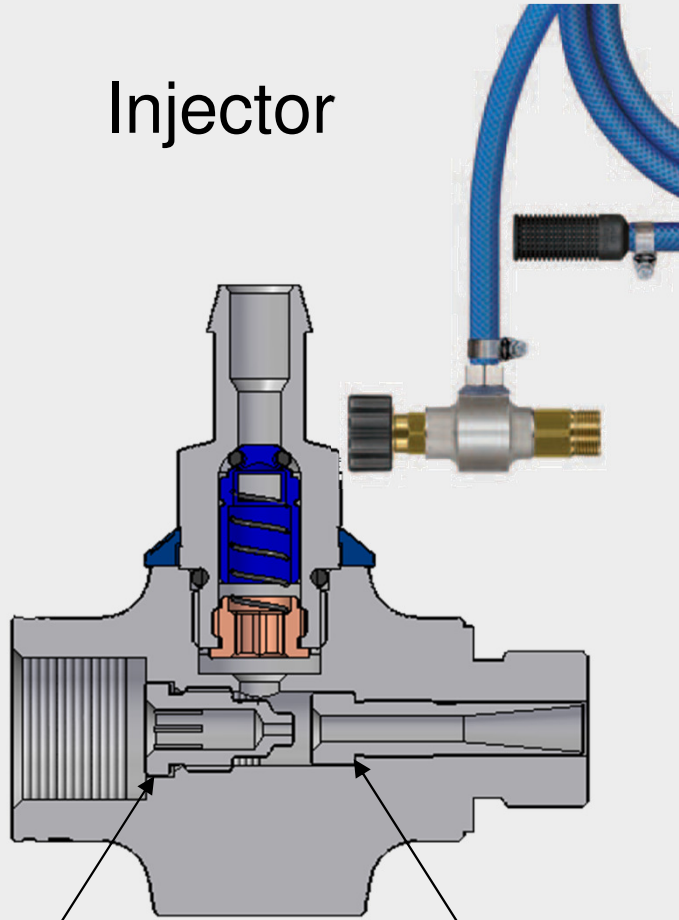


R+M/Suttner Product Information:
Nozzle Sizing ST-16x

February 2017

Foaming with Active Foam Lances

Injector

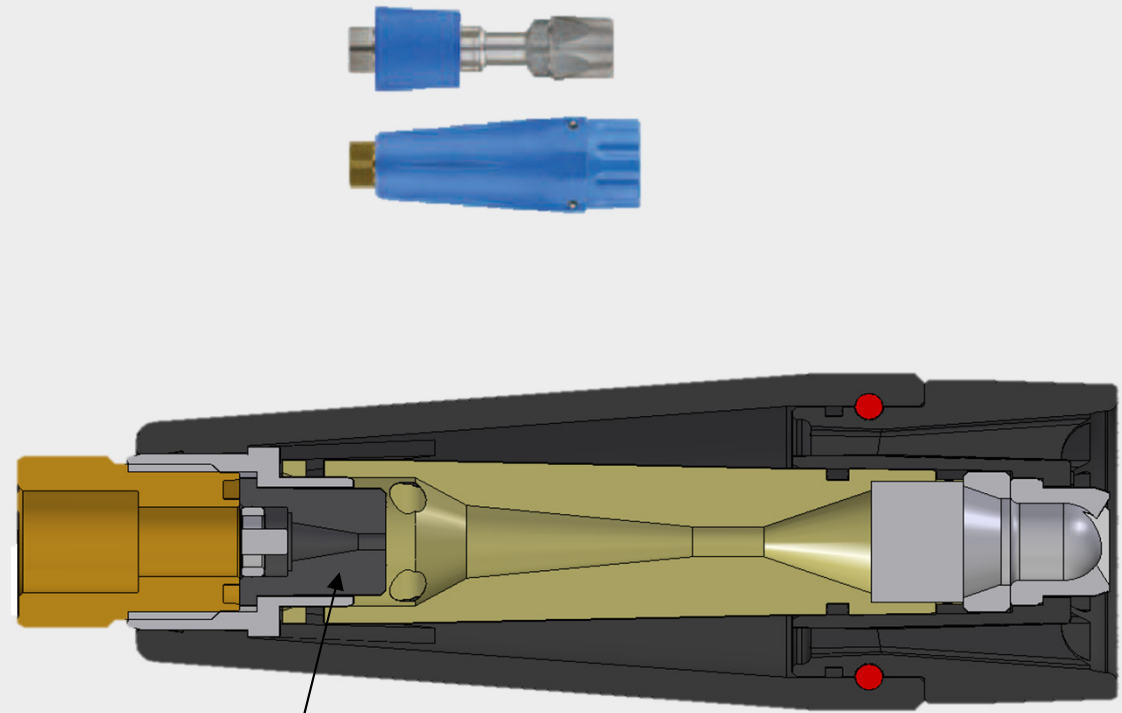


Injector nozzle

Diffusor Nozzle

Diffusor nozzle has to be always bigger than Injector nozzle

Foam Lance



Air Injector nozzle

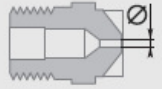
Creates a pressure. Air Injector nozzle has to be always bigger than Injector nozzle

Recommended Combinations

nozzle size	Nozzle size recommendation		Air injector nozzle ST-75/76	ST-72
	Injector nozzle	Diffusornozzle		
(030)	1,2	1,7	200075406	Green
(035)	1,3	1,7	200075406	Green
(040)	1,4	1,7	200075407	Green
(045)	1,5	2	200075408	Green
(055)	1,6	2	200075410	Green
(060)	1,7	2,3	200075710	Green
(070)	1,8	2,3	200075413	Yellow
(080)	1,9	2,3	200075413	Yellow
(085)	2	2,3	200075415	Yellow
(090)	2,1	2,8	200075415	Blue
(100)	2,2	2,8	3x 200075405	Blue
(110)	2,3	2,8	3x 200075406	Blue
(120)	2,4	2,8	3x 200075406	Blue
(125)	2,5	2,8	3x 200075407	Red
(140)	2,6	3,2	3x 200075408	Red
(150)	2,7	3,2	3x 200075408	Red
(180)	2,8	3,2	3x 200075410	Red

Nozzle Sizing

Output in l/min depends on pressure in bar

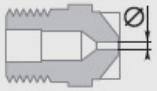


Pressure in bar

D	Ø*	Pressure in bar											
		3	10	20	30	40	50	60	70	80	90	100	110
01	0.59	0.4	0.7	1.0	1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.2	2.3
015	0.71	0.6	1.0	1.5	1.8	2.1	2.4	2.6	2.8	3.0	3.2	3.4	3.6
02	0.84	0.8	1.4	2	2.5	2.8	3.2	3.5	3.7	4.0	4.2	4.5	4.7
025	0.94	1.0	1.6	2.5	3.1	3.5	4.0	4.3	4.7	5.0	5.3	5.6	5.9
03	1.03	1.2	2.0	3.1	3.7	4.3	4.8	5.3	5.7	6.1	6.3	6.8	7.1
035	1.10	1.4	2.5	3.6	4.2	4.9	5.5	6.0	6.5	7.0	7.4	7.8	8.2
04	1.21	1.6	2.8	4.1	5.2	5.9	6.6	7.3	7.8	8.4	8.9	9.4	9.8
045	1.26	1.8	3.1	4.5	5.5	6.4	7.1	7.8	8.4	9.0	9.6	10.2	10.5
05	1.33	2.0	3.5	5.1	6.2	7.1	8.0	8.7	9.4	10.0	10.7	11.3	11.8
055	1.39	2.2	3.7	5.6	6.8	7.8	8.7	9.6	10.3	11.1	11.8	12.4	13.0
06	1.46	2.4	4.1	6.1	7.4	8.6	9.6	10.4	11.3	12.1	12.8	13.6	14.3
065	1.52	2.6	4.3	6.6	8.0	9.3	10.4	11.3	12.3	13.2	14.0	14.7	15.4
07	1.57	2.8	5.0	7.1	8.6	10.0	11.2	12.2	13.2	14.1	15.0	15.8	16.6
075	1.63	3.0	5.3	7.6	9.3	10.7	12.0	13.1	14.2	15.2	16.1	16.9	17.7
08	1.68	3.2	5.6	8.2	9.8	11.3	12.7	14.0	15.1	16.1	17.1	18.0	18.9
085	1.73	3.4	6	8.7	10.4	12.1	13.5	14.8	16.0	17.1	18.1	19.1	20.0
09	1.78	3.6	6.5	9.2	11.1	12.8	14.3	15.7	17.0	18.0	19.2	20.2	21.2
10	1.88	3.9	7.0	10.2	12.3	14.2	16.0	17.4	18.9	20.1	21.4	22.5	23.6
11	1.96	4.3	7.8	11.2	13.4	15.5	17.3	19.0	20.5	22.0	23.3	24.5	25.7
12	2.05	4.7	8.4	12.3	14.6	16.9	18.9	20.8	22.4	24.0	25.4	26.8	28.1
13	2.13	5.1	9.5	13.3	15.9	18.3	20.5	22.5	24.3	26.0	27.5	29.0	30.4
14	2.21	5.5	10.2	14.3	17.1	19.7	22.1	24.2	26.1	28.0	29.6	31.3	32.8
15	2.30	5.9	10.8	15.3	18.5	21.3	23.9	26.1	28.3	30.2	32.1	33.8	35.3
20	2.66	7.9	14	20.5	24.7	28.5	31.9	34.9	37.8	40.3	42.7	45.1	47.2
30	3.25	11.8	21.1	31.0	37.0	42.7	47.8	52.4	56.6	60.5	64.2	67.6	70.9
40	3.76	15.8	28.0	41.0	49.4	57.0	63.7	69.8	75.4	80.7	85.5	90.2	94.6
50	4.28	19.7	35.3	51.0	61.50	71.00	80.00	87.00	94.50	102.50	107.00	112.50	118.00

Nozzle Sizing

Output in l/min depends on pressure in bar



Pressure in bar

		120	130	140	150	160	175	200	225	250	300	400	500
D	∅	←	←	←	←	←	←	←	←	←	←	←	←
01	0.59	2.4	2.5	2.6	2.7	2.8	2.9	3.1	3.3	3.5	3.8	4.4	4.9
015	0.71	3.7	3.8	4.0	4.2	4.3	4.5	4.8	5.1	5.4	5.9	6.7	7.5
02	0.84	4.8	5.0	5.3	5.4	5.6	5.9	6.3	6.7	7.0	7.7	8.9	9.9
025	0.94	6.1	6.4	6.6	6.9	7.1	7.5	8.0	8.5	9.0	9.9	11.4	12.7
03	1.03	7.4	7.7	8.0	8.3	8.6	9.0	9.6	10.2	10.7	11.8	13.5	15.1
035	1.10	8.6	8.9	9.2	9.5	9.8	10.3	11.0	11.7	12.3	13.8	15.5	17.8
04	1.21	10.3	10.7	11.1	11.5	11.9	12.4	13.3	14.1	14.8	16.3	18.7	20.9
045	1.26	10.9	11.4	11.8	12.2	12.6	13.2	14.1	15.0	15.8	17.4	19.9	22.3
05	1.33	12.4	12.9	13.4	13.8	14.3	14.9	16.0	16.9	17.9	19.7	22.6	25.3
055	1.39	13.6	14.1	14.7	15.2	15.7	16.4	17.5	18.6	19.6	21.7	25.0	28.0
06	1.46	14.9	15.5	16.0	16.7	17.2	18.0	19.2	20.4	21.5	23.7	27.1	30.3
065	1.52	16.1	16.8	17.4	18.0	18.6	19.4	20.8	22.0	23.2	25.6	29.3	32.7
07	1.57	17.3	18.0	18.7	19.3	20.0	20.9	22.3	23.7	25.0	27.1	31.3	35.0
075	1.63	18.5	19.3	20.0	20.7	21.4	22.4	23.9	25.3	26.7	29.4	33.7	37.7
08	1.68	19.7	20.5	21.3	22.0	22.8	23.8	25.5	27.0	28.5	31.4	35.9	40.2
085	1.73	20.9	21.8	22.6	23.4	24.1	25.3	27.0	28.6	30.2	34.5	39.8	44.5
09	1.78	22.1	23.0	23.9	24.7	25.5	26.7	28.6	30.3	31.9	35.1	40.2	45.0
10	1.88	24.6	25.6	26.6	27.6	28.5	29.8	31.8	33.7	35.6	39.2	44.9	50.2
11	1.96	26.9	28.0	29.1	30.1	31.1	32.5	34.7	36.8	38.8	43.4	50.1	56.0
12	2.05	29.4	30.6	31.7	32.8	33.9	35.4	37.9	40.2	42.4	46.7	53.4	59.8
13	2.13	31.8	33.1	34.4	35.6	36.7	38.4	41.1	43.6	45.9	50.5	57.8	64.7
14	2.21	34.2	35.6	37.0	38.3	39.5	41.4	44.3	46.9	49.4	55.0	63.5	71.0
15	2.30	36.9	38.4	39.9	41.3	42.6	44.6	47.7	50.6	53.3	58.7	67.2	75.2
20	2.66	49.3	51.3	53.2	55.1	56.9	59.5	63.6	67.5	71.1	78.2	89.6	100.0
30	3.25	74.0	77.1	80.0	82.8	85.5	89.4	95.6	101.0	107.0	118.0	149.0	151.0
40	3.76	98.8	103.0	107.0	110.0	114.0	119.0	127.0	135.0	143.0	157.0	198.0	202.0
50	4.28	123.00	128.00	133.00	138.00	142.50	149.00	159.00	168.50	178.00	196.00	224.50	251.00

Example

Example: 160 bar, 12 l/min.

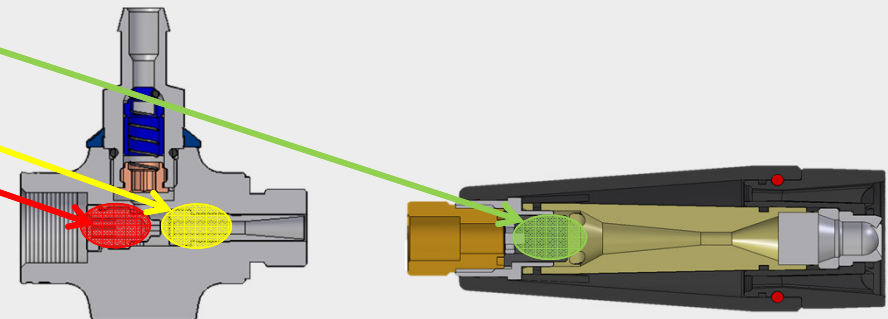
Output in l/min depends on pressure in bar

D	Q*	Pressure in bar											
		3	10	20	30	40	50	60	70	80	90	100	110
01	0.59	0.4	0.7	1.0	1.3	1.4	1.6	1.7	1.8	2.0	2.1	2.2	2.3
015	0.71	0.6	1.0	1.5	1.8	2.1	2.4	2.6	2.8	3.0	3.2	3.4	3.6
02	0.84	0.8	1.4	2	2.5	2.8	3.2	3.5	3.7	4.0	4.2	4.5	4.7
025	0.94	1.0	1.6	2.5	3.1	3.5	4.0	4.3	4.7	5.0	5.3	5.6	5.9
03	1.03	1.2	2.0	3.1	3.7	4.3	4.8	5.3	5.7	6.1	6.3	6.8	7.1
035	1.10	1.4	2.5	3.6	4.2	4.9	5.5	6.0	6.5	7.0	7.4	7.8	8.2
04	1.21	1.6	2.8	4.1	5.2	5.9	6.6	7.3	7.8	8.4	8.9	9.4	9.8
045	1.26	1.8	3.1	4.5	5.5	6.4	7.1	7.8	8.4	9.0	9.6	10.2	10.5
05	1.33	2.0	3.5	5.1	6.2	7.1	8.0	8.7	9.4	10.0	10.7	11.3	11.8
055	1.39	2.2	3.7	5.6	6.8	7.8	8.7	9.6	10.3	11.1	11.8	12.4	13.0
06	1.46	2.4	4.1	6.1	7.4	8.6	9.6	10.4	11.3	12.1	12.8	13.6	14.3
065	1.52	2.6	4.3	6.6	8.0	9.3	10.4	11.3	12.3	13.2	14.0	14.7	15.4
07	1.57	2.8	5.0	7.1	8.6	10.0	11.2	12.2	13.2	14.1	15.0	15.8	16.6
075	1.63	3.0	5.3	7.6	9.3	10.7	12.0	13.1	14.2	15.2	16.1	16.9	17.7
08	1.68	3.2	5.6	8.2	9.8	11.3	12.7	14.0	15.1	16.1	17.1	18.0	18.9
085	1.73	3.4	6	8.7	10.4	12.1	13.5	14.8	16.0	17.1	18.1	19.1	20.0
09	1.78	3.6	6.5	9.2	11.1	12.8	14.3	15.7	17.0	18.0	19.2	20.2	21.2
10	1.88	3.9	7.0	10.2	12.3	14.2	16.0	17.4	18.9	20.1	21.4	22.5	23.6
11	1.96	4.3	7.8	11.2	13.4	15.5	17.3	19.0	20.5	22.0	23.3	24.5	25.7
12	2.05	4.5	8.4	12.3	14.6	16.9	18.9	20.8	22.4	24.0	25.4	26.8	28.1
13	2.13	5.1	9.5	13.3	15.9	18.3	20.5	22.5	24.3	26.0	27.5	29.0	30.4
14	2.21	5.5	10.2	14.3	17.1	19.7	22.1	24.2	26.1	28.0	29.6	31.3	32.8
15	2.30	5.9	10.8	15.3	18.5	21.3	23.9	26.1	28.3	30.2	32.1	33.8	35.3
20	2.7	7.9	14	20.5	24.7	28.5	31.9	34.9	37.8	40.3	42.7	45.1	47.2
30	3.25	11.8	21.1	31.0	37.0	42.7	47.8	52.4	56.6	60.5	64.2	67.6	70.9
40	3.76	15.8	28.0	41.0	49.4	57.0	63.7	69.8	75.4	80.7	85.5	90.2	94.6
50	4.28	19.7	35.3	51.0	61.50	71.00	80.00	87.00	94.50	102.50	107.00	112.50	118.00

Output in l/min depends on pressure in bar

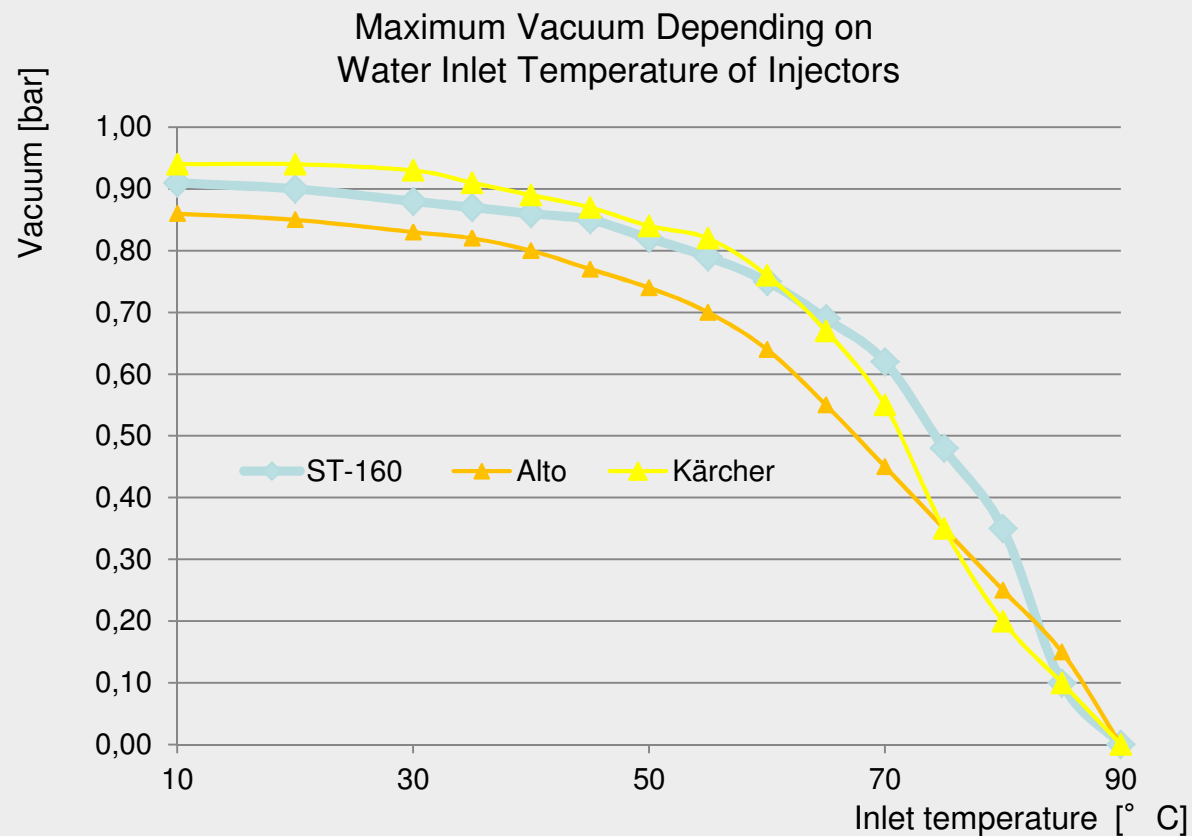
D	Q*	Pressure in bar																
		120	130	140	150	160	175	200	225	250	300	400	500					
01	0.59	2.4	2.5	2.6	2.7	2.8	2.9	3.1	3.3	3.5	3.8	4.4	4.9					
015	0.71	3.7	3.8	4.0	4.2	4.3	4.5	4.8	5.1	5.4	5.9	6.7	7.5					
02	0.84	4.8	5.0	5.3	5.4	5.6	5.9	6.3	6.7	7.0	7.7	8.9	9.9					
025	0.94	6.1	6.4	6.6	6.9	7.1	7.5	8.0	8.5	9.0	9.9	11.4	12.7					
03	1.03	7.4	7.7	8.0	8.3	8.6	9.0	9.6	10.2	10.7	11.8	13.5	15.1					
035	1.10	8.6	8.9	9.2	9.5	9.8	10.3	11.0	11.7	12.3	13.8	15.5	17.8					
04	1.21	10.3	10.7	11.1	11.5	11.9	12.4	13.3	14.1	14.8	16.3	18.7	20.9					
045	1.26	10.9	11.4	11.8	12.2	12.6	13.2	14.1	15.0	15.8	17.4	19.9	22.3					
05	1.33	12.4	12.9	13.4	13.8	14.3	14.9	16.0	16.9	17.9	19.7	22.6	25.3					
055	1.39	13.6	14.1	14.7	15.2	15.7	16.4	17.5	18.6	19.6	21.7	25.0	28.0					
06	1.46	14.9	15.5	16.0	16.7	17.2	18.0	19.2	20.4	21.5	23.7	27.1	30.3					
065	1.52	16.1	16.8	17.4	18.0	18.6	19.4	20.8	22.0	23.2	25.6	29.3	32.7					
07	1.57	17.3	18.0	18.7	19.3	20.0	20.9	22.3	23.7	25.0	27.1	31.3	35.0					
075	1.63	18.5	19.3	20.0	20.7	21.4	22.4	23.9	25.3	26.7	29.4	33.7	37.7					
08	1.68	19.7	20.5	21.3	22.0	22.8	23.8	25.5	27.0	28.5	31.4	35.9	40.2					
085	1.73	20.9	21.8	22.6	23.4	24.1	25.3	27.0	28.6	30.2	34.5	39.8	44.5					
09	1.78	22.1	23.0	23.9	24.7	25.5	26.7	28.6	30.3	31.9	35.1	40.2	45.0					
10	1.88	24.6	25.6	26.6	27.6	28.5	29.8	31.8	33.7	35.6	39.2	44.9	50.2					
11	1.96	26.9	28.0	29.1	30.1	31.1	32.5	34.7	36.8	38.8	43.4	50.1	56.0					
12	2.05	29.4	30.6	31.7	32.8	33.9	35.4	37.9	40.2	42.4	46.7	53.4	59.8					
13	2.13	31.8	33.1	34.4	35.6	36.7	38.4	41.1	43.6	45.9	50.5	57.8	64.7					
14	2.21	34.2	35.6	37.0	38.3	39.5	41.4	44.3	46.9	49.4	55.0	63.5	71.0					
15	2.30	36.9	38.4	39.9	41.3	42.6	44.6	47.7	50.6	53.3	58.7	67.2	75.2					
20	2.66	49.3	51.3	53.2	55.1	56.9	59.5	63.6	67.5	71.1	78.2	89.6	100.0					
30	3.25	74.0	77.1	80.0	82.8	85.5	89.4	95.6	101.0	107.0	118.0	149.0	151.0					
40	3.76	98.8	103.0	107.0	110.0	114.0	119.0	127.0	135.0	143.0	157.0	198.0	202.0					
50	4.28	123.00	128.00	133.00	138.00	142.50	149.00	159.00	168.50	178.00	196.00	224.50	251.00					

nozzle size	Nozzle size recommendation			
	Injector nozzle	Diffusor nozzle	Air injector nozzle ST-75/76	
(030)	1,2	1,7	200075406	
(035)	1,3	1,7	200075406	
(040)	1,4	1,7	200075407	
(045)	1,5	2	200075406	
(055)	1,6	2	200075410	
(060)	1,7	2,3	200075710	
(070)	1,8	2,3	200075413	
(080)	1,9	2,3	200075413	
(085)	2	2,3	200075415	
(090)	2,1	2,8	200075415	
(100)	2,2	2,8	3x 200075405	
(110)	2,3	2,8	3x 200075406	
(120)	2,4	2,8	3x 200075406	
(125)	2,5	2,8	3x 200075407	
(140)	2,6	3,2	3x 200075408	
(150)	2,7	3,2	3x 200075408	
(180)	2,8	3,2	3x 200075410	



Injectors and Hot Water

Inlet- Temperature	Vacuum in bar		
	ST-160	Alto	Kärcher
90	0,00	0,00	0,00
85	0,10	0,15	0,10
80	0,35	0,25	0,20
75	0,48	0,35	0,35
70	0,62	0,45	0,55
65	0,69	0,55	0,67
60	0,75	0,64	0,76
55	0,79	0,70	0,82
50	0,82	0,74	0,84
45	0,85	0,77	0,87
40	0,86	0,80	0,89
35	0,87	0,82	0,91
30	0,88	0,83	0,93
20	0,90	0,85	0,94
10	0,91	0,86	0,94



Conclusion:

Chemical suction highly depends on water temperature.

At higher temperatures the maximum achievable vacuum drops significantly.
Above 90°C it is not possible to measure any vacuum.