



اسپری نازل های صنعتی

مخروطی کامل

FULL CONE

INDUSTRIAL SPRAY NOZZLES

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Axial Flow Full-Cone Spray Nozzles Spadflow Series 3SF 05

Webpage
+ STP



3SF 05

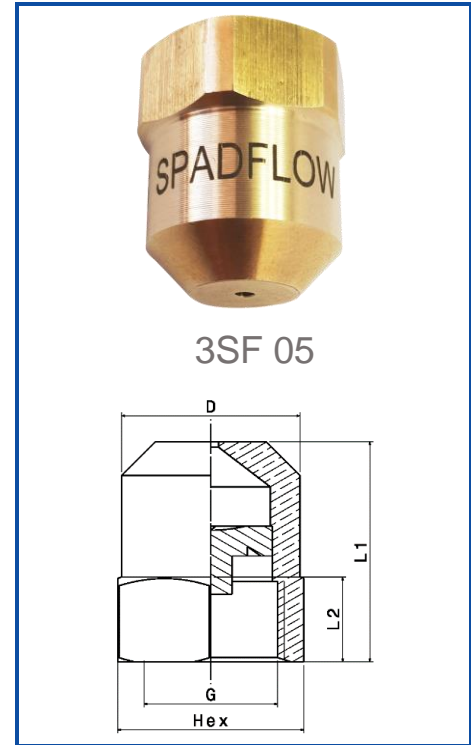
Steel Industry Nozzle

Applications:

- Secondary cooling for continuous casting machine
- Products cooling
- Tank cooling
- Steel cleaning
- Pre-treatment in coating process
- Dust removal in mining and coal plants
- Spray of chemicals
- Leak test

Properties:

- Sprayed volume is evenly distributed across spray pattern
- Available with a range of spray angle
- Male and female thread available
- Good resistance to clogging



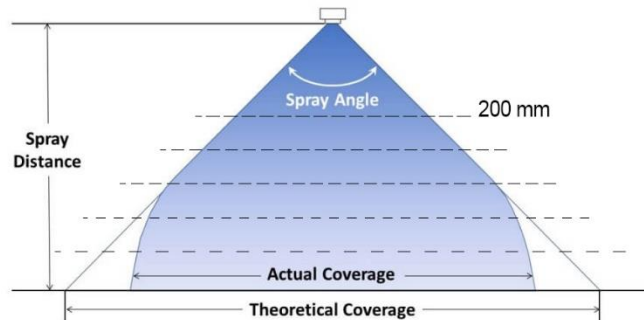
Size*	Conn. code			Dimensions [mm]				Weight
	BSPT	BSPP	NPT	L ₁	L ₂	D	Hex/Flats	
3/8"	038T	038P	038N	26.5	10	21.5	22	55 g

* Different connection sizes are available upon request

Material**	Code
Brass	1
S.S.304	2
S.S.316	3

** Different materials are available upon request

α	Spray coverage
	@ 200 mm
45°	80
50°	90
55°	105
60°	115
65°	130
70°	140
80°	170
90°	200



Spray angle	Code	General Code	Flow rate [l/min]						
			P [bar]						
			1.0 <i>K factor</i>	2.0	2.8	3.0	5.0	7.0	10
45°	3SF 05 020 . 45	2045	1.20	1.70	2.00	2.08	2.68	3.17	3.79
	3SF 05 025 . 45	2545	1.49	2.11	2.50	2.58	3.33	3.94	4.71
	3SF 05 030 . 45	3045	1.80	2.55	3.00	3.12	4.02	4.76	5.69
	3SF 05 035 . 45	3545	2.10	2.97	3.50	3.64	4.70	5.56	6.64
	3SF 05 040 . 45	4045	2.40	3.39	4.00	4.16	5.37	6.35	7.59

Order No.: CODE . MATERIAL

Example: 3SF 05 040 . 065 . 038T . 1 Type 3SF 05 with mentioned Q(lpm)@P(bar), Spray angle: 65°, 3/8" BSPT, Brass **3 - 1**

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3SF 05

Webpage
+ STP



Spray angle	Code	General Code	Flow rate [l/min]						
			P [bar]						
			1.0 <i>K factor</i>	2.0	2.8	3.0	5.0	7.0	10
45°	3SF 05 047 . 45	4745	2.80	3.96	4.70	4.85	6.26	7.41	8.85
	3SF 05 050 . 45	5045	3.00	4.24	5.00	5.20	6.71	7.94	9.49
	3SF 05 055 . 45	5545	3.29	4.65	5.50	5.69	7.35	8.70	10.39
	3SF 05 060 . 45	6045	3.60	5.09	6.00	6.24	8.05	9.52	11.38
	3SF 05 070 . 45	7045	4.18	5.91	7.00	7.24	9.35	11.06	13.22
	3SF 05 080 . 45	8045	4.80	6.79	8.00	8.31	10.73	12.70	15.18
	3SF 05 100 . 45	10045	5.98	8.45	10.00	10.35	13.36	15.81	18.90
	3SF 05 120 . 45	12045	7.17	10.14	12.00	12.42	16.04	18.97	22.68
50°	3SF 05 060 . 50	6050	3.59	5.07	6.00	6.21	8.02	9.49	11.34
55°	3SF 05 060 . 55	6055	3.59	5.07	6.00	6.21	8.02	9.49	11.34
60°	3SF 05 014 . 60	1460	0.86	1.22	1.44	1.49	1.92	2.28	2.72
	3SF 05 022 . 60	2260	1.29	1.82	2.16	2.23	2.88	3.41	4.08
	3SF 05 025 . 60	2560	1.49	2.11	2.50	2.59	3.34	3.95	4.72
	3SF 05 027 . 60	2760	1.61	2.28	2.70	2.79	3.61	4.27	5.10
	3SF 05 030 . 60	3060	1.79	2.54	3.00	3.11	4.01	4.74	5.67
	3SF 05 035 . 60	3560	2.09	2.96	3.50	3.62	4.68	5.53	6.61
	3SF 05 036 . 60	3660	2.15	3.04	3.60	3.72	4.81	5.69	6.80
	3SF 05 049 . 60	4960	2.93	4.14	4.90	5.07	6.55	7.75	9.27
	3SF 05 060 . 60	6060	3.61	5.11	6.04	6.25	8.07	9.55	11.42
	3SF 05 072 . 60	7260	4.29	6.07	7.18	7.43	9.59	11.35	13.57
3SF 05 165 . 60	16560	9.86	13.95	16.50	17.08	22.05	26.09	31.18	
65°	3SF 05 010 . 65	1065	0.60	0.85	1.00	1.04	1.34	1.58	1.89
	3SF 05 015 . 65	1565	0.90	1.27	1.50	1.55	2.00	2.37	2.83
	3SF 05 016 . 65	1665	0.96	1.35	1.60	1.66	2.14	2.53	3.02
	3SF 05 020 . 65	2065	1.20	1.69	2.00	2.07	2.67	3.16	3.78
	3SF 05 024 . 65	2465	1.40	1.98	2.40	2.42	3.13	3.70	4.43
	3SF 05 025 . 65	2565	1.49	2.11	2.50	2.59	3.34	3.95	4.72
	3SF 05 030 . 65	3065	1.79	2.54	3.00	3.11	4.01	4.74	5.67
	3SF 05 033 . 65	3365	1.96	2.77	3.28	3.39	4.38	5.19	6.20
	3SF 05 035 . 65	3565	2.09	2.96	3.50	3.62	4.68	5.53	6.61
	3SF 05 038 . 65	3865	2.27	3.21	3.80	3.93	5.08	6.01	7.18
	3SF 05 040 . 65	4065	2.39	3.38	4.00	4.14	5.35	6.32	7.56
	3SF 05 042 . 65	4265	2.51	3.55	4.20	4.35	5.61	6.64	7.94
	3SF 05 045 . 65	4565	2.69	3.80	4.50	4.66	6.01	7.12	8.50
	3SF 05 047 . 65	4765	2.81	3.97	4.70	4.86	6.28	7.43	8.88
	3SF 05 050 . 65	5065	3.00	4.24	5.00	5.20	6.71	7.94	9.49
	3SF 05 055 . 65	5565	3.28	4.64	5.50	5.68	7.33	8.68	10.37
	3SF 05 059 . 65	5965	3.50	4.95	5.90	6.06	7.83	9.26	11.07
	3SF 05 060 . 65	6065	3.59	5.07	6.00	6.21	8.02	9.49	11.34
	3SF 05 065 . 65	6565	3.88	5.49	6.50	6.73	8.69	10.28	12.28
	3SF 05 066 . 65	6665	3.94	5.58	6.60	6.83	8.82	10.44	12.47
	3SF 05 070 . 65	7065	4.18	5.92	7.00	7.25	9.35	11.07	13.23
	3SF 05 072 . 65	7265	4.30	6.09	7.20	7.45	9.62	11.38	13.61
	3SF 05 073 . 65	7365	4.36	6.17	7.30	7.56	9.76	11.54	13.80
	3SF 05 075 . 65	7565	4.48	6.34	7.50	7.76	10.02	11.86	14.17
	3SF 05 080 . 65	8065	4.78	6.76	8.00	8.28	10.69	12.65	15.12
	3SF 05 085 . 65	8565	5.08	7.18	8.50	8.80	11.36	13.44	16.06
	3SF 05 090 . 65	9065	5.40	7.64	9.00	9.35	12.07	14.29	17.08
	3SF 05 095 . 65	9565	5.68	8.03	9.50	9.83	12.69	15.02	17.95
	3SF 05 100 . 65	10065	5.98	8.45	10.00	10.35	13.36	15.81	18.90
	3SF 05 120 . 65	12065	7.17	10.14	12.00	12.42	16.04	18.97	22.68
	3SF 05 130 . 65	13065	7.77	10.99	13.00	13.46	17.37	20.56	24.57
	3SF 05 146 . 65	14665	8.73	12.34	14.60	15.11	19.51	23.08	27.59
	3SF 05 150 . 65	15065	8.96	12.67	15.00	15.52	20.04	23.71	28.33
	3SF 05 160 . 65	16065	9.55	13.51	16.00	16.54	21.35	25.27	30.20
3SF 05 165 . 65	16565	9.86	13.95	16.50	17.08	22.05	26.09	31.18	
3SF 05 170 . 65	17065	10.16	14.37	17.00	17.60	22.72	26.88	32.13	
70°	3SF 05 026 . 70	2670	1.55	2.20	2.60	2.69	3.47	4.11	4.91
	3SF 05 052 . 70	5270	3.11	4.39	5.20	5.38	6.95	8.22	9.83
	3SF 05 062 . 70	6270	3.71	5.24	6.20	6.42	8.29	9.80	11.72

Order No.: **CODE . MATERIAL**

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3SF 05

Webpage
+ STP



3SF 05

Spray angle	Code	General Code	Flow rate [l/min]						
			P [bar]						
			1.0 <i>K factor</i>	2.0	2.8	3.0	5.0	7.0	10
80°	3SF 05 015 . 80	1580	0.90	1.27	1.50	1.56	2.01	2.38	2.85
	3SF 05 020 . 80	2080	1.20	1.69	2.00	2.07	2.67	3.16	3.78
	3SF 05 025 . 80	2580	1.49	2.11	2.49	2.58	3.33	3.94	4.71
	3SF 05 030 . 80	3080	1.79	2.54	3.00	3.11	4.01	4.74	5.67
	3SF 05 033 . 80	3380	1.96	2.77	3.28	3.39	4.38	5.19	6.20
	3SF 05 035 . 80	3580	2.09	2.96	3.50	3.62	4.68	5.53	6.61
	3SF 05 040 . 80	4080	2.39	3.38	4.00	4.14	5.35	6.32	7.56
	3SF 05 045 . 80	4580	2.69	3.80	4.50	4.66	6.01	7.12	8.50
	3SF 05 050 . 80	5080	2.99	4.23	5.00	5.18	6.68	7.91	9.45
	3SF 05 060 . 80	6080	3.59	5.07	6.00	6.21	8.02	9.49	11.34
	3SF 05 075 . 80	7580	4.50	6.36	7.53	7.79	10.06	11.91	14.23
	3SF 05 080 . 80	8080	4.78	6.76	8.00	8.28	10.69	12.65	15.12
	3SF 05 085 . 80	8580	5.08	7.18	8.50	8.80	11.36	13.44	16.06
	3SF 05 098 . 80	9880	5.86	8.28	9.80	10.14	13.10	15.50	18.52
	3SF 05 102 . 80	10280	6.10	8.62	10.20	10.56	13.63	16.13	19.28
	3SF 05 106 . 80	10680	6.33	8.96	10.60	10.97	14.16	16.76	20.03
	3SF 05 110 . 80	11080	6.57	9.30	11.00	11.39	14.70	17.39	20.79
	3SF 05 118 . 80	11880	7.05	9.97	11.80	12.21	15.77	18.66	22.30
3SF 05 129 . 80	12980	7.71	10.90	12.90	13.35	17.24	20.40	24.38	
3SF 05 150 . 80	15080	8.96	12.68	15.00	15.53	20.04	23.72	28.35	
3SF 05 160 . 80	16080	9.56	13.52	16.00	16.56	21.38	25.30	30.24	
90°	3SF 05 015 . 90	1590	0.90	1.27	1.50	1.56	2.01	2.38	2.85
	3SF 05 020 . 90	2090	1.20	1.70	2.00	2.08	2.68	3.17	3.79
	3SF 05 025 . 90	2590	1.49	2.11	2.50	2.59	3.34	3.95	4.72
	3SF 05 030 . 90	3090	1.79	2.54	3.00	3.11	4.01	4.74	5.67
	3SF 05 035 . 90	3590	2.09	2.96	3.50	3.62	4.67	5.53	6.61
	3SF 05 038 . 90	3890	2.27	3.21	3.80	3.93	5.08	6.01	7.18
	3SF 05 040 . 90	4090	2.39	3.38	4.00	4.14	5.35	6.32	7.56
	3SF 05 045 . 90	4590	2.69	3.80	4.50	4.66	6.01	7.12	8.50
	3SF 05 046 . 90	4690	2.75	3.89	4.60	4.76	6.15	7.27	8.69
	3SF 05 050 . 90	5090	2.99	4.23	5.00	5.18	6.68	7.91	9.45
	3SF 05 055 . 90	5590	3.29	4.65	5.50	5.69	7.35	8.70	10.39
	3SF 05 060 . 90	6090	3.59	5.07	6.00	6.21	8.02	9.49	11.34
	3SF 05 065 . 90	6590	3.88	5.49	6.50	6.73	8.69	10.28	12.28
	3SF 05 074 . 90	7490	4.42	6.25	7.40	7.66	9.89	11.70	13.98
	3SF 05 080 . 90	8090	4.78	6.76	8.00	8.28	10.69	12.65	15.12
	3SF 05 090 . 90	9090	5.38	7.61	9.00	9.32	12.03	14.23	17.01
	3SF 05 095 . 90	9590	5.68	8.03	9.50	9.83	12.69	15.02	17.95
	3SF 05 100 . 90	10090	5.98	8.45	10.00	10.35	13.36	15.81	18.90
3SF 05 110 . 90	11090	6.57	9.30	11.00	11.39	14.70	17.39	20.79	
3SF 05 120 . 90	12090	7.17	10.14	12.00	12.42	16.04	18.97	22.68	
3SF 05 146 . 90	14690	8.73	12.34	14.60	15.11	19.51	23.08	27.59	

Order No.: CODE . MATERIAL

Example: 3SF 05 040 . 065 . 038T . 1 Type 3SF 05 with mentioned Q(lpm)@P(bar), Spray angle: 65° , 3/8" BSPT, Brass

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3L 490 – 3L 491

Webpage
+ STP



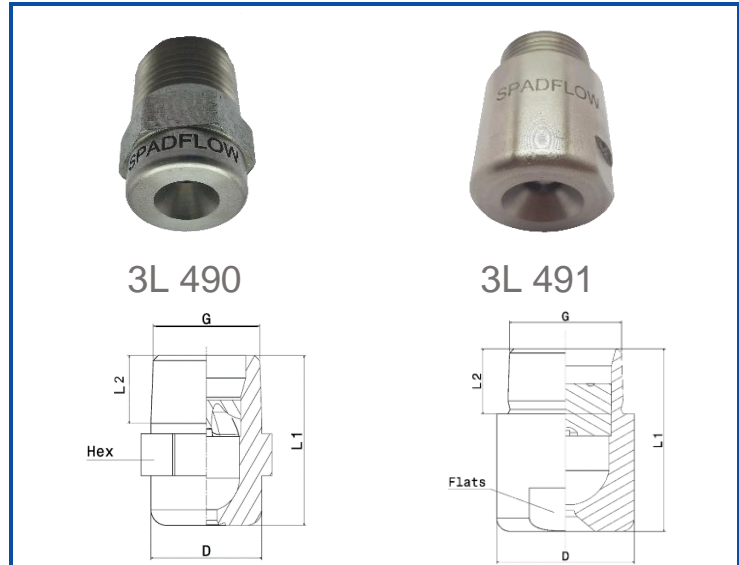
Standard S-Type Nozzle

Applications:

- Cleaning and washing
- Surface spraying
- Container cleaning
- Foam precipitation
- Degassing of liquids

Properties:

- Non-clogging nozzle
- Very stable spray angle
- Even liquid distribution
- Large free cross sections

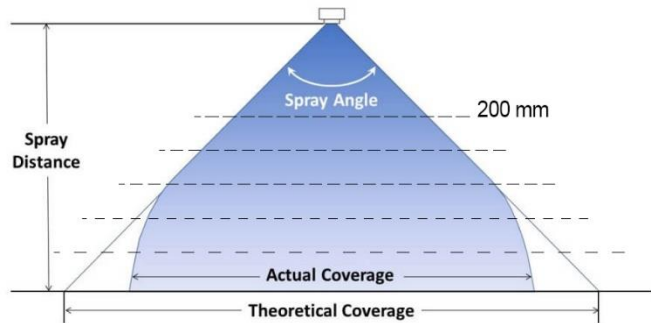


Size	Conn. code			Dimensions [mm]				Weight
	BSPT	BSPP	NPT	L ₁	L ₂	D	Hex/Flats	
1/8"	018T	018P	018N	18.0	6.5	10.0	11	13 g
1/4"	014T	014P	014N	22.0	10.0	13.0	14	16 g
3/8"	038T	038P	038N	24.5	10.0	16.0	17	30 g
3/8"	038T	038P	038N	30.0	10.0	16.0	17	50 g
1/2"	012T	012P	012N	32.5	13.0	21.0	22	60 g
1/2"	012T	012P	012N	43.5	13.0	21.0	22	85 g
3/4"	034T	034P	034N	42.0	15.0	32.0	27	190 g
1"	100T	100P	100N	56.0	17.0	40.0	36	350 g

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage
	@ 200 mm
45°	160
60°	220
90°	380-390
120°	680



Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]						
					P [bar]						
					0.5	1.0	2.0	3.0	5.0	7.0	10.0
45°	3L 490 40 . 045	1/8"-1/4"	1.25	1.25	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 490 52 . 045	1/8"-1/4"	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 490 60 . 045	1/4"-3/8"	2.00	2.00	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 490 64 . 045	1/4"-3/8"	2.45	2.45	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 490 68 . 045	3/8"	2.55	2.55	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 490 70 . 045	3/8"	2.65	2.65	3.22	4.24	5.60	6.59	8.08	9.24	10.66
	3L 490 72 . 045	3/8"	2.85	2.85	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 490 78 . 045	1/2"	3.45	3.45	5.17	6.82	9.00	10.58	12.98	14.85	17.12
3L 490 84 . 045	1/2"	3.80	3.80	7.18	9.47	12.50	14.70	18.03	20.63	23.80	
60°	3L 490 40 . 060	1/8"-1/4"	1.15	1.15	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 490 44 . 060	1/8"-1/4"	1.25	1.25	0.72	0.95	1.25	1.47	1.80	2.06	2.38

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 490 40 . 060 . 014T . 3 Type 3L 490 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3L 490 – 3L 491



Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]						
					P [bar]						
					0.5	1.0 <i>K factor</i>	2.0	3.0	5.0	7.0	10.0
60°	3L 490 48 . 060	1/8"-1/4"	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 490 52 . 060	1/8"-1/4"	1.60	1.60	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 490 56 . 060	1/8"-1/4"	1.80	1.80	1.44	1.89	2.50	2.94	3.61	4.13	4.76
	3L 490 60 . 060	1/8"-1/4"-3/8"	2.05	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 490 64 . 060	1/4"-3/8"	2.30	2.30	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 490 68 . 060	1/4"-3/8"	2.60	2.60	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 490 72 . 060	1/4"-3/8"	2.95	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 490 76 . 060	3/8"	3.25	3.25	4.59	6.06	8.00	9.41	11.54	13.20	15.22
	3L 490 80 . 060	3/8"	3.70	3.70	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 490 84 . 060	1/2"	4.05	4.05	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 490 88 . 060	1/2"	4.65	4.65	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 490 92 . 060	3/4"	5.20	5.20	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 490 96 . 060	3/4"	5.80	5.80	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 491 04 . 060	1"	7.25	7.25	22.97	30.31	40.00	47.04	57.71	66.02	76.15
3L 491 08 . 060	1"	8.15	8.15	28.72	37.89	50.00	58.80	72.14	82.53	95.18	
90°	3L 490 40 . 090	1/8"-1/4"	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 490 44 . 090	1/8"-1/4"	1.30	1.30	0.72	0.95	1.25	1.47	1.80	2.06	2.38
	3L 490 48 . 090	1/8"-1/4"	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 490 52 . 090	1/8"-1/4"	1.70	1.55	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 490 56 . 090	1/8"-1/4"	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76
	3L 490 60 . 090	1/8"-3/8"	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 490 64 . 090	1/4"-3/8"	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 490 68 . 090	1/4"-3/8"	2.70	2.70	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 490 72 . 090	1/4"-3/8"	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 490 74 . 090	3/8"	3.15	3.15	4.08	5.38	7.10	8.35	10.24	11.72	13.52
	3L 490 76 . 090	3/8"	3.40	3.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22
	3L 490 80 . 090	3/8"	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 490 84 . 090	3/8"	4.65	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 490 88 . 090	1/2"	5.45	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 490 92 . 090	1/2"	5.90	4.50	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 490 96 . 090	1/2"-3/4"	6.55	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 491 00 . 090	3/4"	7.55	5.50	18.09	23.87	31.50	37.05	45.45	51.99	59.97
	3L 491 04 . 090	3/4"	8.60	6.60	22.97	30.31	40.00	47.04	57.71	66.02	76.15
3L 491 08 . 090	1"	9.45	7.25	28.72	37.89	50.00	58.80	72.14	82.53	95.18	
3L 491 12 . 090	1"	10.40	8.00	36.18	47.75	63.00	74.09	90.89	103.98	119.93	
3L 491 14 . 090	1"	11.00	7.50	40.78	53.81	71.00	83.50	102.43	117.19	135.16	
120°	3L 490 36 . 120	1/8"-1/4"	0.85	0.65	0.36	0.48	0.63	0.74	0.91	1.04	1.20
	3L 490 40 . 120	1/8"-1/4"	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 490 44 . 120	1/8"-1/4"	1.30	1.30	0.72	0.95	1.25	1.47	1.80	2.06	2.38
	3L 490 48 . 120	1/8"-1/4"	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 490 52 . 120	1/8"-1/4"	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 490 56 . 120	1/8"-1/4"	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76
	3L 490 60 . 120	1/8"-1/4"	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 490 64 . 120	1/4"-3/8"	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 490 68 . 120	1/4"-3/8"	2.75	2.75	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 490 72 . 120	1/4"-3/8"	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 490 74 . 120	3/8"	3.20	3.20	4.08	5.38	7.10	8.35	10.24	11.72	13.52
	3L 490 76 . 120	3/8"	3.45	3.45	4.59	6.44	8.00	9.41	11.54	13.20	15.22
	3L 490 80 . 120	3/8"	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 490 84 . 120	3/8"	4.70	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 490 88 . 120	1/2"	5.10	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 490 92 . 120	1/2"	5.80	4.75	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 490 96 . 120	1/2"-3/4"	6.65	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 491 04 . 120	3/4"	9.20	5.85	22.97	30.31	40.00	47.04	57.71	66.02	76.15
3L 491 12 . 120	1"	10.80	7.75	36.18	47.75	63.00	74.09	90.89	103.98	119.93	
3L 491 14 . 120	1"	11.40	7.65	40.78	53.81	71.00	83.50	102.43	117.19	135.16	

** Different connection sizes are available upon request
B = bore diameter E = narrowest free cross section

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 490 40 . 060 . 014T . 3 Type 3L 490 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles Spadflow Series 3L460 – 3L461

Webpage
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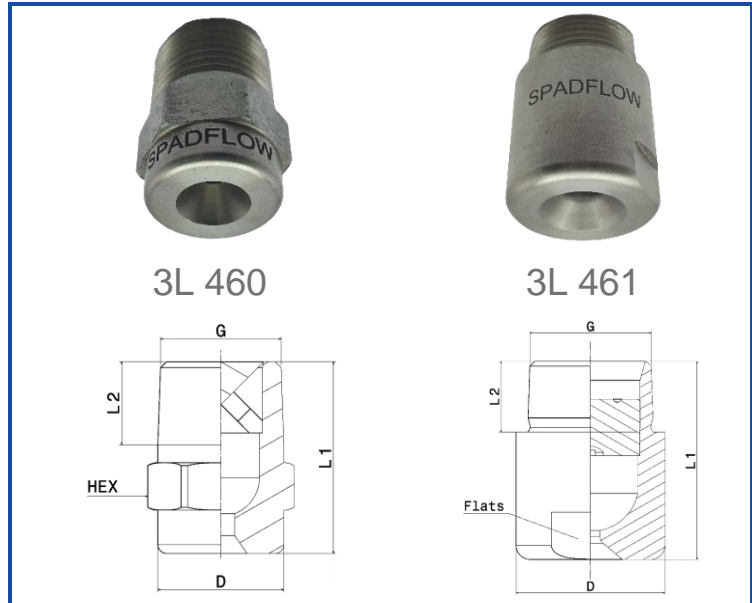
Standard X-type Nozzle

Applications:

- Cleaning and washing
- Cooling of gaseous fluids and solids
- Surface spraying
- Spraying onto mats in air washers
- Improving of chemical reactions

Properties:

- Very uniform spray pattern
- Large free cross-sections
- Optimized x-style swirl inserts

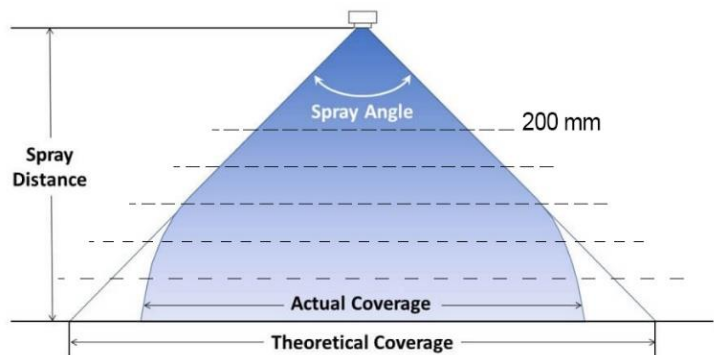


Size	Conn. code			Dimensions [mm]				Weight
	BSPT	BSPP	NPT	L ₁	L ₂	D	Hex/Flats	
1/8"	018T	018P	018N	18.0	6.5	10.0	11	15 g
1/4"	014T	014P	014N	22.0	10.0	13.0	14	17 g
3/8"	038T	038P	038N	24.5	10.0	16.0	17	30 g
3/8"	038T	038P	038N	30.0	10.0	16.0	17	50 g
1/2"	012T	012P	012N	32.5	13.0	21.0	22	67 g
1/2"	012T	012P	012N	43.5	13.0	21.0	22	85 g
3/4"	034T	034P	034N	42.0	15.0	32.0	27	170 g
3/4"	034T	034P	034N	50.0	15.0	32.0	27	200 g
1"	100T	100P	100N	56.0	17.0	40.0	36	360 g

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage @ 200 mm
45°	160
60°	220
90°	380-390
120°	680



Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]						
					P [bar]						
					0.5	1.0	2.0	3.0	5.0	7.0	10.0
45°	3L 460 40 . 045	1/8"-1/4"	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 460 52 . 045	1/8"-1/4"	1.50	1.35	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 460 60 . 045	1/4"-3/8"	1.90	1.80	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 460 64 . 045	1/4"-3/8"	2.15	2.00	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 460 68 . 045	1/4"-3/8"	2.40	2.00	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 460 70 . 045	3/8"	2.55	2.20	3.22	4.24	5.60	6.59	8.08	9.24	10.66
	3L 460 72 . 045	3/8"	2.70	2.35	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 460 78 . 045	1/2"	3.20	3.20	5.17	6.82	9.00	10.58	12.98	14.85	17.12
3L 460 84 . 045	1/2"	3.80	3.70	7.18	9.47	12.50	14.70	18.03	20.63	23.80	

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 460 40 . 060 . 014T . 3 Type 3L460 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3L460 – 3L461

Webpage
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Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]						
					P [bar]						
					0.5	1.0 <i>K factor</i>	2.0	3.0	5.0	7.0	10.0
60°	3L 460 40 . 060	1/8"-1/4"	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 460 44 . 060	1/8"-1/4"	1.30	1.05	0.72	0.95	1.25	1.47	1.80	2.06	2.38
	3L 460 48 . 060	1/8"-1/4"	1.45	1.15	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 460 52 . 060	1/8"-1/4"	1.60	1.20	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 460 60 . 060	1/8"-1/4"-3/8"	2.05	1.40	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 460 64 . 060	1/4"-3/8"	2.40	1.90	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 460 68 . 060	1/4"-3/8"	2.60	2.00	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 460 72 . 060	1/4"-3/8"	2.90	2.00	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 460 76 . 060	3/8"	3.25	2.85	4.59	6.06	8.00	9.41	11.54	13.20	15.22
	3L 460 80 . 060	3/8"	3.60	2.95	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 460 84 . 060	1/2"	4.00	3.30	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 460 88 . 060	1/2"	4.50	3.70	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 460 92 . 060	3/4"	5.20	4.50	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 460 96 . 060	3/4"	5.80	4.90	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 461 04 . 060	1"	7.20	5.40	22.97	30.31	40.00	47.04	57.71	66.02	76.15
3L 461 08 . 060	1"	8.60	6.50	28.72	37.89	50.00	58.80	72.14	82.53	95.18	
90°	3L 460 32 . 090	1/8"-1/4"	0.80	0.55	0.23	0.30	0.40	0.47	0.58	0.66	0.76
	3L 460 40 . 090	1/8"-1/4"	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 460 44 . 090	1/8"-1/4"	1.30	1.00	0.72	0.95	1.25	1.47	1.80	2.06	2.38
	3L 460 48 . 090	1/8"-1/4"	1.45	1.20	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 460 52 . 090	1/8"-1/4"	1.65	1.30	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 460 56 . 090	1/8"-1/4"	1.85	1.30	1.44	1.89	2.50	2.94	3.61	4.13	4.76
	3L 460 60 . 090	1/8"-3/8"	2.05	1.45	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 460 64 . 090	1/4"-3/8"	2.30	1.80	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 460 68 . 090	1/4"-3/8"	2.60	1.80	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 460 72 . 090	1/4"-3/8"	2.95	2.00	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 460 74 . 090	3/8"	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52
	3L 460 76 . 090	3/8"	3.30	2.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22
	3L 460 80 . 090	3/8"	3.70	2.70	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 460 84 . 090	3/8"	4.05	3.20	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 460 88 . 090	1/2"	4.70	3.10	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 460 92 . 090	1/2"	5.20	3.80	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 460 96 . 090	1/2"-3/4"	5.80	3.80	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 461 00 . 090	1/2"-3/4"	6.40	3.80	18.09	23.87	31.50	37.05	45.45	51.99	59.97
	3L 461 04 . 090	3/4"	7.20	5.30	22.97	30.31	40.00	47.04	57.71	66.02	76.15
3L 461 08 . 090	3/4"-1"	8.20	5.30	28.72	37.89	50.00	58.80	72.14	82.53	95.18	
3L 461 12 . 090	1"	9.30	6.50	36.18	47.75	63.00	74.09	90.89	103.98	119.93	
3L 461 14 . 090	1"	9.90	6.70	40.78	53.81	71.00	83.50	102.43	117.19	135.16	
120°	3L 460 36 . 120	1/8"-1/4"	0.95	0.70	0.36	0.48	0.63	0.74	0.91	1.04	1.20
	3L 460 40 . 120	1/8"-1/4"	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90
	3L 460 44 . 120	1/8"-1/4"	1.30	0.90	0.72	0.95	1.25	1.47	1.80	2.06	2.38
	3L 460 48 . 120	1/8"-1/4"	1.50	1.00	0.92	1.21	1.60	1.88	2.31	2.64	3.05
	3L 460 52 . 120	1/8"-1/4"	1.65	1.20	1.15	1.52	2.00	2.35	2.89	3.30	3.81
	3L 460 56 . 120	1/8"-1/4"	1.90	1.35	1.44	1.89	2.50	2.94	3.61	4.13	4.76
	3L 460 60 . 120	1/8"-1/4"	2.10	1.40	1.81	2.39	3.15	3.70	4.54	5.20	6.00
	3L 460 64 . 120	1/4"-3/8"	2.45	1.60	2.30	3.03	4.00	4.70	5.77	6.60	7.61
	3L 460 68 . 120	1/4"-3/8"	2.75	1.80	2.87	3.79	5.00	5.88	7.21	8.25	9.52
	3L 460 72 . 120	1/4"-3/8"	3.10	1.90	3.62	4.77	6.30	7.41	9.09	10.40	11.99
	3L 460 74 . 120	3/8"	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52
	3L 460 76 . 120	3/8"	3.50	1.90	4.59	6.44	8.00	9.41	11.54	13.20	15.22
	3L 460 80 . 120	3/8"	3.80	2.40	5.74	7.58	10.00	11.76	14.43	16.51	19.04
	3L 460 84 . 120	3/8"	4.20	2.70	7.18	9.47	12.50	14.70	18.03	20.63	23.80
	3L 460 88 . 120	1/2"	4.60	3.10	9.19	12.13	16.00	18.82	23.08	26.41	30.46
	3L 460 92 . 120	1/2"	5.30	3.30	11.49	15.16	20.00	23.52	28.85	33.01	38.07
	3L 460 96 . 120	1/2"-3/4"	5.90	4.10	14.36	18.95	25.00	29.40	36.07	41.26	47.59
	3L 461 04 . 120	3/4"	7.60	4.90	22.97	30.31	40.00	47.04	57.71	66.02	76.15
	3L 461 12 . 120	1"	9.60	6.60	36.18	47.75	63.00	74.09	90.89	103.98	119.93
3L 461 14 . 120	1"	10.00	6.60	40.78	53.81	71.00	83.50	102.43	117.19	135.16	

** Different connection sizes are available upon request

B = bore diameter E = narrowest free cross section

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 460 40 . 060 . 014T . 3 Type 3L460 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles Spadflow Series 3L 405

Webpage
+ STP



3L 405

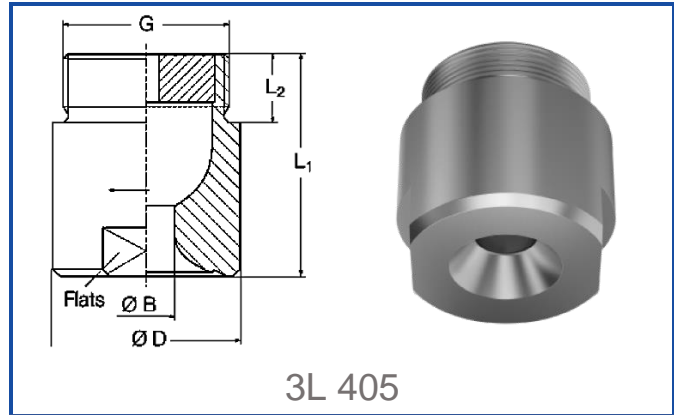
High Flow Full-Cone Nozzle

Applications:

- Cleaning and washing
- Surface spraying
- Spraying over packings
- Chemical process engineering
- Cooling of gaseous fluids and solids
- Water treatment

Properties:

- Very uniform spray pattern

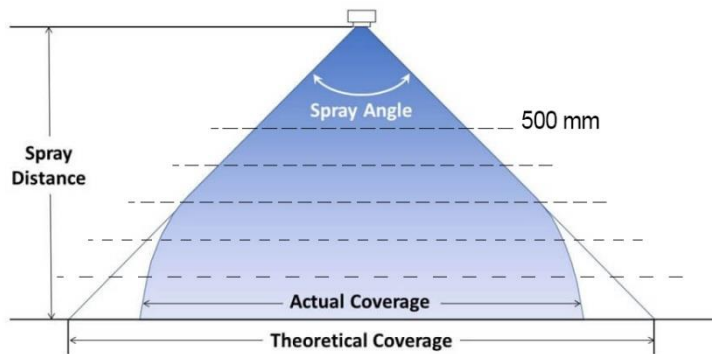


Size	Conn. code			Dimensions [mm]				Weight
	BSPT	BSPP	NPT	L ₁	L ₂	D	Flats	
1 1/4"	114T	114P	114N	50.0	19.0	49.0	41	500 g
1 1/2"	112T	112P	112N	60.0	19.0	59.0	50	900 g
2"	200T	200P	200N	78.0	24.0	68.0	60	1600 g

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage
	@ 500 mm
60°	560-580
90°	780-850
120°	1450-1500



Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]					
					P [bar]					
					0.3	0.5	1.0 <i>K factor</i>	2.0	3.0	5.0
60°	3L 405 20 . 060	1 1/4"	11.20	5.80	47	57	76	100	118	144
	3L 405 28 . 060	1 1/2"	14.30	7.00	75	92	121	160	188	231
	3L 405 32 . 060	2"	16.40	7.50	94	115	152	200	235	289
	3L 405 36 . 060	2"	18.40	8.50	117	144	189	250	294	361
	3L 405 40 . 060	2"	20.00	7.00	147	181	239	315	370	454
90°	3L 405 20 . 090	1 1/4"	12.00	5.00	47	57	76	100	118	144
	3L 405 28 . 090	1 1/2"	15.20	6.20	75	92	121	160	188	231
	3L 405 32 . 090	2"	17.20	7.70	94	115	152	200	235	289
	3L 405 36 . 090	2"	19.50	8.70	117	144	189	250	294	361
	3L 405 40 . 090	2"	22.00	9.50	147	181	239	315	370	454
120°	3L 405 20 . 120	1 1/4"	12.70	5.00	47	57	76	100	118	144
	3L 405 28 . 120	1 1/2"	16.00	6.60	75	92	121	160	188	231
	3L 405 32 . 120	2"	17.80	7.90	94	115	152	200	235	289
	3L 405 36 . 120	2"	20.10	8.80	117	144	189	250	294	361
	3L 405 40 . 120	2"	22.40	9.10	147	181	239	315	370	454

** Different connection sizes are available upon request
B = bore diameter E = narrowest free cross section

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 405 . 20 . 060 . 114T . 3 Type 3L 405 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1 1/4" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles

Spadflow Series 3L 403

Webpage
+ STP



3L 403

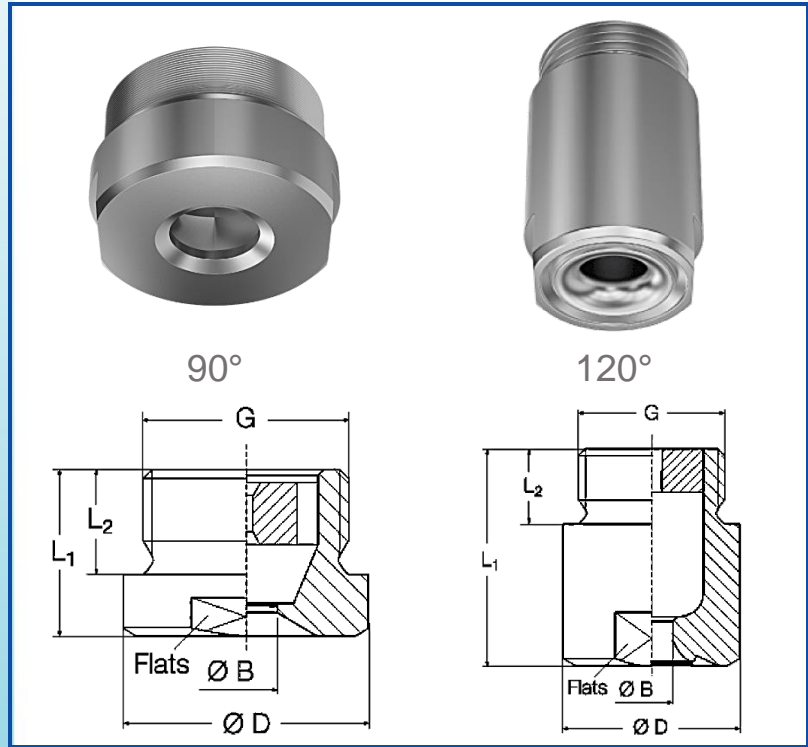
Very High Flow Full-Cone Nozzle

Applications:

- Surface spraying
- Spraying over packings
- Chemical process engineering
- Cooling of gaseous fluids and solids
- Cleaning and washing process

Properties:

- Very uniform spray pattern



Version	Size	Conn. code			Dimensions [mm]				Weight
		BSPT	BSPP	NPT	L ₁	L ₂	D	Flats	
90°	2 1/2"	212T	212P	212N	52	27	83	75	1,300 g
	3"	300T	300P	300N	60	30	98	85	2,000 g
	3 1/2"	312T	312P	312N	70	32	118	105	3,600 g

90° version

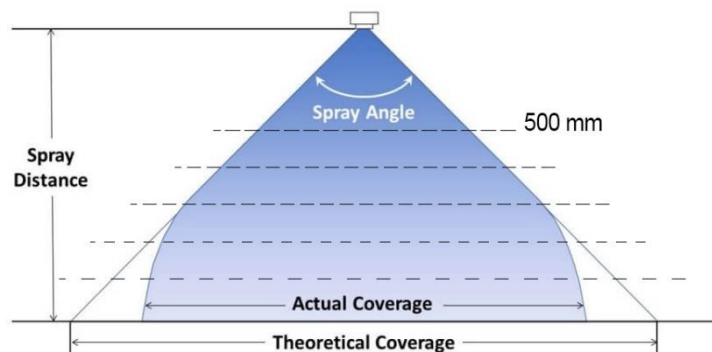
Version	Size	Conn. code			Dimensions [mm]				Weight
		BSPT	BSPP	NPT	L ₁	L ₂	D	Flats	
120°	2 1/2"	212T	212P	212N	124	27	83	75	3,200 g
	3"	300T	300P	300N	153	30	98	85	5,400 g
	3 1/2"	312T	312P	312N	156	32	118	105	8,300 g
	4"	400T	400P	400N	165	36	128	110	9,600 g

120° version

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage @ 500 mm
90°	900-980
120°	1500-1600



Order No.: CODE . CONNECTION . MATERIAL

Example: 3L 403 44 . 090 . 212T . 3 Type 3L 403 with mentioned Q(lpm)@P(bar), Spray angle: 90°, 2 1/2" BSPT, S.S.316

Axial Flow Full-Cone Spray Nozzles Spadflow Series 3L 403

Webpage
+ STP



Spray angle (α)	Code	Connection** [inch]	B ∅ [mm]	E ∅ [mm]	Flow rate [l/min]						
					P [bar]						
					0.3	0.5	1.0 <i>K</i> factor	2.0	3.0	5.0	7.0
90°	3L 403 44 . 090	2 1/2"	25.00	12.00	187	230	303	400	470	577	660
	3L 403 48 . 090	2 1/2"	29.50	12.00	234	287	379	500	588	721	825
	3L 403 52 . 090	3"	32.00	13.80	295	362	477	630	741	909	1,040
	3L 403 60 . 090	3 1/2"	40.00	15.00	468	574	758	1,000	1,176	1,443	1,651
120°	3L 403 44 . 120	2 1/2"	25.50	10.00	187	230	303	400	470	577	660
	3L 403 48 . 120	2 1/2"	29.50	11.00	234	287	379	500	588	721	825
	3L 403 52 . 120	3"	32.00	15.00	295	362	477	630	741	909	1,040
	3L 403 60 . 120	3 1/2"	42.00	12.00	469	574	758	1,000	1,176	1,443	1,651
	3L 403 62 . 120	4"	45.00	15.00	585	718	947	1,250	1,470	1,903	2,063

** Different connection sizes are available upon request
B = bore diameter E = narrowest free cross section

Order No.: **CODE . CONNECTION . MATERIAL**

Example: 3L 403 44 . 090 . 212T . 3 Type 3L 403 with mentioned Q(lpm)@P(bar), Spray angle: 90°, 2 1/2" BSPT, S.S.316

Tangential Flow Full-Cone Spray Nozzles

Spadflow Series 3L 422 – 3L 423

Webpage
+ STP



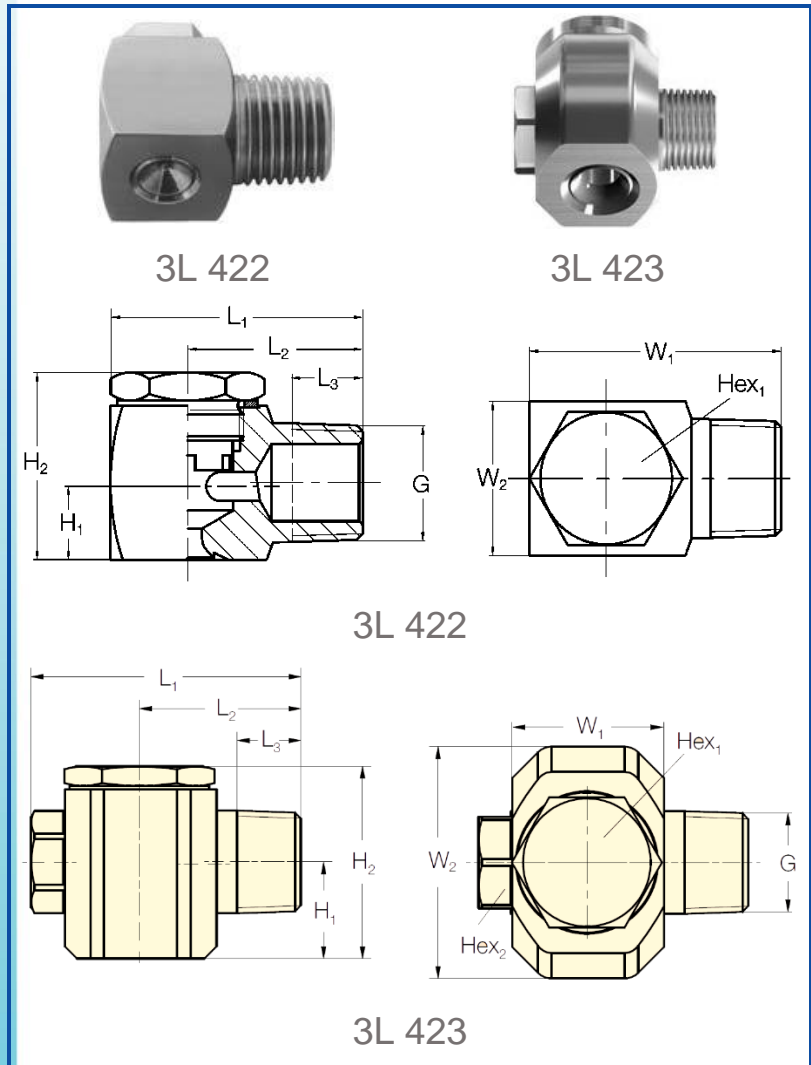
Tangential Full-Cone Nozzle

Applications:

- Cleaning and washing processes
- Cooling of gaseous fluids and solids
- Surface spraying
- Spraying onto mats in air washers
- Improving on chemical reactions
- Continuous casting
- Foam control

Properties:

- Tangentially arranged liquid supply
- Without swirl inserts
- Non-clogging
- Stable spray angle
- Uniform spray

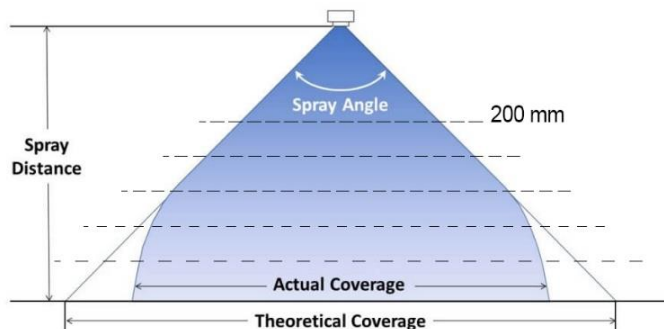


Size	Conn. code			Dimensions [mm]									Weight S.S.316L
	BSPT	BSPP	NPT	L ₁	L ₂	L ₃	H ₁	H ₂	W ₁	W ₂	Hex ₁	Hex ₂	
1/4"	014T	014P	014N	28.0	20.0	9.7	8.0	21.0	15.6	16.0	11	-	44 g
3/8"	038T	038P	038N	36.0	25.0	10.1	11.0	26.7	23.2	22.0	19	-	101 g
1/2"	012T	012P	012N	56.0	33.5	13.2	20.0	40.0	32.0	48.0	27	19	370 g
3/4"	034T	034P	034N	65.5	38.5	14.5	23.5	57.0	40.0	63.0	36	27	830 g
1"	100T	100P	100N	85.0	48.5	16.8	27.3	66.0	55.0	78.0	41	36	1,581 g

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage @ 200 mm
60°	225
90°	380-390
120°	680



Order No.: CODE . CONNETION . MATERIAL

Example: 3L 422 64 . 060 . 038T . 3 Type 3L 422 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 3/8" BSPT, S.S.316

Tangential Flow Full-Cone Spray Nozzles

Spadflow Series 3L 422 – 3L 423



Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]					
					P [bar]					
					0.5	1.0 <i>K factor</i>	2.0	3.0	5.0	10.0
60°	3L 422 64 . 060	3/8"	3.00	3.00	2.00	2.83	4.00	4.90	6.32	8.94
	3L 422 40 . 090	1/4"	1.40	1.40	0.50	0.71	1.00	1.22	1.58	2.24
90°	3L 422 48 . 090	1/4"	1.85	1.85	0.80	1.13	1.60	1.96	2.53	3.58
	3L 422 56 . 090	1/4"	2.25	2.25	1.25	1.77	2.50	3.06	3.95	5.59
	3L 422 60 . 090	3/8"	2.55	2.55	1.57	2.23	3.15	3.86	4.98	7.04
	3L 422 64 . 090	3/8"	2.90	2.90	2.00	2.83	4.00	4.90	6.32	8.94
	3L 422 72 . 090	3/8"	3.70	3.70	3.15	4.45	6.30	7.72	9.96	14.09
	3L 422 76 . 090	3/8"	4.15	4.15	4.00	5.66	8.00	9.80	12.65	17.89
	3L 422 80 . 090	3/8"	4.65	4.65	5.00	7.07	10.00	12.25	15.81	22.36
	3L 422 84 . 090	3/8"	5.30	5.30	6.25	8.84	12.50	15.31	19.76	27.95
	3L 422 88 . 090	3/8"	5.85	6.00	8.00	11.31	16.00	19.60	25.30	35.78
	3L 422 96 . 090	1/2"	8.00	8.00	12.50	17.68	25.00	30.62	39.53	55.90
120°	3L 422 48 . 120	1/4"	1.90	1.90	0.80	1.13	1.60	1.96	2.53	3.58
	3L 422 56 . 120	1/4"	2.45	2.40	1.25	1.77	2.50	3.06	3.95	5.59
	3L 422 60 . 120	3/8"	2.70	2.70	1.57	2.23	3.15	3.86	4.98	7.04
	3L 422 72 . 120	3/8"	4.00	3.90	3.15	4.45	6.30	7.72	9.96	14.09
	3L 422 80 . 120	3/8"	4.90	4.90	5.00	7.07	10.00	12.25	15.81	22.36
	3L 422 84 . 120	3/8"	5.30	5.30	6.25	8.84	12.50	15.31	19.76	27.95
	3L 422 88 . 120	3/8"	6.60	6.00	8.00	11.31	16.00	19.60	25.30	35.78
	3L 422 92 . 120	1/2"	7.30	7.30	10.00	14.14	20.00	24.49	31.62	44.72
	3L 422 96 . 120	1/2"	8.00	8.00	12.50	17.68	25.00	30.62	39.53	55.90
	3L 423 00 . 120	1/2"	8.70	8.70	15.75	22.27	31.50	38.88	49.81	70.44
3L 423 12 . 120	3/4"	12.70	12.30	31.50	44.55	63.00	77.16	99.61	140.87	
3L 423 20 . 120	1"	17.00	16.00	50.00	70.71	100.00	122.47	158.11	223.61	

** Different connection sizes are available upon request
B = bore diameter E = narrowest free cross section

Order No.: CODE . CONNETION . MATERIAL

Example: 3L 422 64 . 060 . 038T . 3 Type 3L 422 with mentioned Q(lpm)@P(bar), Spray angle: 60°, 3/8" BSPT, S.S.316



3B TF

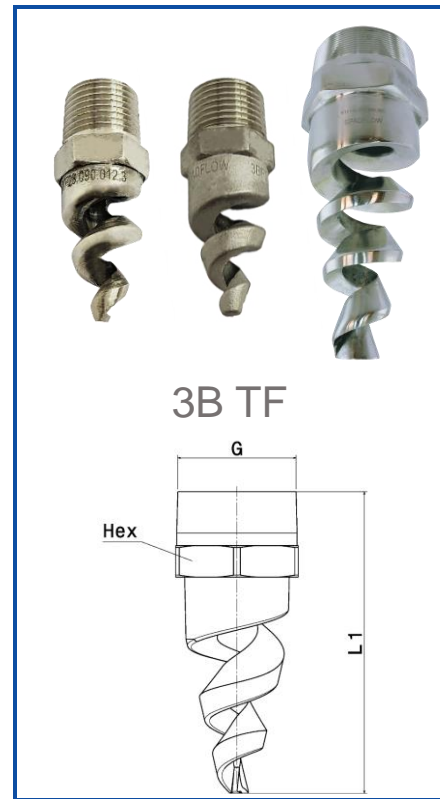
Spiral Full-Cone Nozzle

Applications:

- Scrub hydrofluoric acid, ammonia, and other highly soluble gases
- Aerate waste water treatment, fish ponds, and impoundment ponds
- Process cooling for food, chemical, and industrial processes
- Various cooling setups
- Dust control
- Fire protection
- Humidification
- Quenching
- Scrubbing

Properties:

- High energy efficiency
- One-piece/no internal parts
- Clog-resistant performance
- High discharge velocity
- Fine atomization

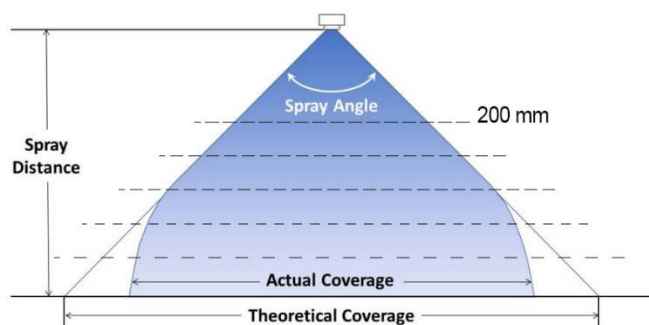


Size	K factor	Conn. code			Dimensions [mm]			Weight (g) (metal)
		BSPT	BSPP	NPT	L ₁	L ₂	Hex	
1/8	3.19	1/8T	1/8P	1/8N	42.9	42.9	14.3	28
1/8	5.93	1/8T	1/8P	1/8N	42.9	55.6	14.3	28
1/4	3.19	1/4T	1/4P	1/4N	47.6	47.6	14.3	35
1/4	3.19<	1/4T	1/4P	1/4N	47.6	60.3	14.3	35
3/8	all	3/8T	3/8P	3/8N	47.6	60.5	17.5	46
1/2	all	1/2T	1/2P	1/2N	63.5	77.7	22.2	85
3/4	95.7	3/4T	3/4P	3/4N	69.9	88.9	28.6	156
1	all	1T	1P	1N	92.1	111	34.9	241
1 1/2	<438	1 1/2T	1 1/2P	1 1/2N	111	137	50.8	624
1 1/2	438	1 1/2T	1 1/2P	1 1/2N	111	143	50.8	624
2	638	2T	2P	2N	143	175	63.5	1300
2	806	2T	2P	2N	176	178	63.5	1530
3	all	3T	3P	3N	219	235	88.9	3230
4	2390	4T	4P	4N	257	-	114	4790

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage @ 200 mm
45°	160
60°	220
90°	380-390
120°	680



Order No.: CODE . CONNETION . MATERIAL

Example: 3B TF 06 . 060 . 014T . 3 Type 3B TF with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Spiral Full-Cone Spray Nozzles
Spadflow Series 3B TF

Webpage
+ STP



3B TF

Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]							
					P [bar]							
					0.5	0.7	1.0 <i>K factor</i>	2.0	3.0	5.0	10.0	20.0
60°	3B TF 06 . 060	1/8"-1/4"-3/8"	2.38	2.38	2.26	2.67	3.19	4.5	5.5	7.1	10.1	14.3
	3B TF 08 . 060	1/8"-1/4"-3/8"	3.18	3.18	4.19	4.96	5.93	8.4	10.3	13.2	18.7	26.5
	3B TF 10 . 060	1/4"-3/8"	3.97	3.18	6.45	7.63	9.12	12.9	15.8	20.4	28.8	40.8
	3B TF 12 . 060	3/8"	4.76	3.18	9.67	11.4	13.7	19.3	23.7	30.6	43.2	61.1
	3B TF 14 . 060	3/8"	5.56	3.18	13.1	15.4	18.5	26.1	32.0	41.3	58.4	82.6
	3B TF 16 . 060	3/8"	6.35	3.18	17.1	20.2	24.2	34.2	41.8	54.0	76.4	108
	3B TF 20 . 060	3/8"	7.94	3.18	26.6	31.5	37.6	53.2	65.1	84.1	119	168
	3B TF 24 . 060	1/2"	9.53	4.76	38.8	46.0	54.9	77.7	95.1	123	174	246
	3B TF 28 . 060	1/2"	11.1	4.76	53.2	62.9	75.2	106	130	168	238	336
	3B TF 32 . 060	3/4"	12.7	4.76	67.7	80.1	95.7	135	166	214	303	428
	3B TF 40 . 060	1"	15.9	6.35	108	128	153	216	264	341	483	683
	3B TF 48 . 060	1"	19.1	6.35	153	181	216	306	375	484	685	968
	3B TF 56 . 060	1 1/2"	22.2	7.94	208	246	294	416	509	657	930	1320
	3B TF 64 . 060	1 1/2"	25.4	7.94	272	322	385	545	667	861	1220	1720
	3B TF 72 . 060	1 1/2"	28.6	7.94	309	366	438	619	758	978	1380	1960
	3B TF 88 . 060	2"	34.9	11.1	451	534	638	902	1110	1430	2020	2850
3B TF 96 . 060	2"	38.1	11.1	570	674	806	1140	1400	1800	2550	3600	
3B TF 112 . 060	3"	44.5	14.3	825	976	1170	1650	2020	2610	3690	5220	
3B TF 128 . 060	3"	50.8	14.3	1090	1290	1550	2190	2680	3460	4891	6920	
3B TF 160 . 060	4"	63.5	15.9	1690	2000	2390	3380	4140	5350	7570	10700	
90°	3B TF 06 . 090	1/8"-1/4"-3/8"	2.38	2.38	2.26	2.67	3.19	4.5	5.5	7.1	10.1	14.3
	3B TF 08 . 090	1/8"-1/4"-3/8"	3.18	3.18	4.19	4.96	5.93	8.4	10.3	13.2	18.7	26.5
	3B TF 10 . 090	1/4"-3/8"	3.97	3.18	6.45	7.63	9.12	12.9	15.8	20.4	28.8	40.8
	3B TF 12 . 090	3/8"	4.76	3.18	9.67	11.4	13.7	19.3	23.7	30.6	43.2	61.1
	3B TF 14 . 090	3/8"	5.56	3.18	13.1	15.4	18.5	26.1	32.0	41.3	58.4	82.6
	3B TF 16 . 090	3/8"	6.35	3.18	17.1	20.2	24.2	34.2	41.8	54.0	76.4	108
	3B TF 20 . 090	3/8"	7.94	3.18	26.6	31.5	37.6	53.2	65.1	84.1	119	168
	3B TF 24 . 090	1/2"	9.53	4.76	38.8	46.0	54.9	77.7	95.1	123	174	246
	3B TF 28 . 090	1/2"	11.1	4.76	53.2	62.9	75.2	106	130	168	238	336
	3B TF 32 . 090	3/4"	12.7	4.76	67.7	80.1	95.7	135	166	214	303	428
	3B TF 40 . 090	1"	15.9	6.35	108	128	153	216	264	341	483	683
	3B TF 48 . 090	1"	19.1	6.35	153	181	216	306	375	484	685	968
	3B TF 56 . 090	1 1/2"	22.2	7.94	208	246	294	416	509	657	930	1320
	3B TF 64 . 090	1 1/2"	25.4	7.94	272	322	385	545	667	861	1220	1720
	3B TF 72 . 090	1 1/2"	28.6	7.94	309	366	438	619	758	978	1380	1960
	3B TF 88 . 090	2"	34.9	11.1	451	534	638	902	1110	1430	2020	2850
3B TF 96 . 090	2"	38.1	11.1	570	674	806	1140	1400	1800	2550	3600	
3B TF 112 . 090	3"	44.5	14.3	825	976	1170	1650	2020	2610	3690	5220	
3B TF 128 . 090	3"	50.8	14.3	1090	1290	1550	2190	2680	3460	4891	6920	
3B TF 160 . 090	4"	63.5	15.9	1690	2000	2390	3380	4140	5350	7570	10700	
120°	3B TF 06 . 120	1/8"-1/4"-3/8"	2.38	2.38	2.26	2.67	3.19	4.5	5.5	7.1	10.1	14.3
	3B TF 08 . 120	1/8"-1/4"-3/8"	3.18	3.18	4.19	4.96	5.93	8.4	10.3	13.2	18.7	26.5
	3B TF 10 . 120	1/4"-3/8"	3.97	3.18	6.45	7.63	9.12	12.9	15.8	20.4	28.8	40.8
	3B TF 12 . 120	3/8"	4.76	3.18	9.67	11.4	13.7	19.3	23.7	30.6	43.2	61.1
	3B TF 14 . 120	3/8"	5.56	3.18	13.1	15.4	18.5	26.1	32.0	41.3	58.4	82.6
	3B TF 16 . 120	3/8"	6.35	3.18	17.1	20.2	24.2	34.2	41.8	54.0	76.4	108
	3B TF 20 . 120	3/8"	7.94	3.18	26.6	31.5	37.6	53.2	65.1	84.1	119	168
	3B TF 24 . 120	1/2"	9.53	4.76	38.8	46.0	54.9	77.7	95.1	123	174	246
	3B TF 28 . 120	1/2"	11.1	4.76	53.2	62.9	75.2	106	130	168	238	336
	3B TF 32 . 120	3/4"	12.7	4.76	67.7	80.1	95.7	135	166	214	303	428
	3B TF 40 . 120	1"	15.9	6.35	108	128	153	216	264	341	483	683
	3B TF 48 . 120	1"	19.1	6.35	153	181	216	306	375	484	685	968
	3B TF 56 . 120	1 1/2"	22.2	7.94	208	246	294	416	509	657	930	1320
	3B TF 64 . 120	1 1/2"	25.4	7.94	272	322	385	545	667	861	1220	1720
	3B TF 72 . 120	1 1/2"	28.6	7.94	309	366	438	619	758	978	1380	1960
	3B TF 88 . 120	2"	34.9	11.1	451	534	638	902	1110	1430	2020	2850
3B TF 96 . 120	2"	38.1	11.1	570	674	806	1140	1400	1800	2550	3600	
3B TF 112 . 120	3"	44.5	14.3	825	976	1170	1650	2020	2610	3690	5220	
3B TF 128 . 120	3"	50.8	14.3	1090	1290	1550	2190	2680	3460	4891	6920	
3B TF 160 . 120	4"	63.5	15.9	1690	2000	2390	3380	4140	5350	7570	10700	

Order No.: CODE . CONNETION . MATERIAL

Example: 3B TF 06 . 060 . 014T . 3 Type 3B TF with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316

Spiral Full-Cone Spray Nozzles

Spadflow Series 3B TF

Webpage
+ STP



3B TF

Spray angle (α)	Code	Connection** [inch]	B Ø [mm]	E Ø [mm]	Flow rate [l/min]							
					P [bar]							
					0.5	0.7	1.0 <i>K factor</i>	2.0	3.0	5.0	10.0	20.0
150°	3B TF 06 . 150	1/8"-1/4"	2.38	2.38	2.26	2.67	3.19	4.5	5.5	7.1	10.1	14.3
	3B TF 08 . 150	1/8"-1/4"	3.18	3.18	4.19	4.96	5.93	8.4	10.3	13.2	18.7	26.5
	3B TF 10 . 150	1/4"	3.97	3.18	6.45	7.63	9.12	12.9	15.8	20.4	28.8	40.8
	3B TF 12 . 150	3/8"	4.76	3.18	9.67	11.4	13.7	19.3	23.7	30.6	43.2	61.1
	3B TF 14 . 150	3/8"	5.56	3.18	13.1	15.4	18.5	26.1	32.0	41.3	58.4	82.6
	3B TF 16 . 150	3/8"	6.35	3.18	17.1	20.2	24.2	34.2	41.8	54.0	76.4	108
	3B TF 20 . 150	3/8"	7.94	3.18	26.6	31.5	37.6	53.2	65.1	84.1	119	168
	3B TF 24 . 150	1/2"	9.53	4.76	38.8	46.0	54.9	77.7	95.1	123	174	246
	3B TF 28 . 150	1/2"	11.1	4.76	53.2	62.9	75.2	106	130	168	238	336
	3B TF 32 . 150	3/4"	12.7	4.76	67.7	80.1	95.7	135	166	214	303	428
	3B TF 40 . 150	1"	15.9	6.35	108	128	153	216	264	341	483	683
	3B TF 48 . 150	1"	19.1	6.35	153	181	216	306	375	484	685	968
	3B TF 56 . 150	1 1/2"	22.2	7.94	208	246	294	416	509	657	930	1320
	3B TF 64 . 150	1 1/2"	25.4	7.94	272	322	385	545	667	861	1220	1720
	3B TF 72 . 150	1 1/2"	28.6	7.94	309	366	438	619	758	978	1380	1960
	3B TF 88 . 150	2"	34.9	11.1	451	534	638	902	1110	1430	2020	2850
3B TF 96 . 150	2"	38.1	11.1	570	674	806	1140	1400	1800	2550	3600	
3B TF 112 . 150	3"	44.5	14.3	825	976	1170	1650	2020	2610	3690	5220	
3B TF 128 . 150	3"	50.8	14.3	1090	1290	1550	2190	2680	3460	4891	6920	
170°	3B TF 06 . 170	1/8"-1/4"	2.38	2.38	2.26	2.67	3.19	4.5	5.5	7.1	10.1	14.3
	3B TF 08 . 170	1/8"-1/4"	3.18	3.18	4.19	4.96	5.93	8.4	10.3	13.2	18.7	26.5
	3B TF 10 . 170	1/4"	3.97	3.18	6.45	7.63	9.12	12.9	15.8	20.4	28.8	40.8
	3B TF 12 . 170	3/8"	4.76	3.18	9.67	11.4	13.7	19.3	23.7	30.6	43.2	61.1
	3B TF 14 . 170	3/8"	5.56	3.18	13.1	15.4	18.5	26.1	32.0	41.3	58.4	82.6
	3B TF 16 . 170	3/8"	6.35	3.18	17.1	20.2	24.2	34.2	41.8	54.0	76.4	108
	3B TF 20 . 170	3/8"	7.94	3.18	26.6	31.5	37.6	53.2	65.1	84.1	119	168
	3B TF 24 . 170	1/2"	9.53	4.76	38.8	46.0	54.9	77.7	95.1	123	174	246
	3B TF 28 . 170	1/2"	11.1	4.76	53.2	62.9	75.2	106	130	168	238	336
	3B TF 32 . 170	3/4"	12.7	4.76	67.7	80.1	95.7	135	166	214	303	428
	3B TF 40 . 170	1"	15.9	6.35	108	128	153	216	264	341	483	683
	3B TF 48 . 170	1"	19.1	6.35	153	181	216	306	375	484	685	968
	3B TF 56 . 170	1 1/2"	22.2	7.94	208	246	294	416	509	657	930	1320
	3B TF 64 . 170	1 1/2"	25.4	7.94	272	322	385	545	667	861	1220	1720
	3B TF 72 . 170	1 1/2"	28.6	7.94	309	366	438	619	758	978	1380	1960
	3B TF 88 . 170	2"	34.9	11.1	451	534	638	902	1110	1430	2020	2850
3B TF 96 . 170	2"	38.1	11.1	570	674	806	1140	1400	1800	2550	3600	
3B TF 112 . 170	3"	44.5	14.3	825	976	1170	1650	2020	2610	3690	5220	
3B TF 128 . 170	3"	50.8	14.3	1090	1290	1550	2190	2680	3460	4891	6920	

** Different connection sizes are available upon request

B = bore diameter E = narrowest free cross section

Order No.: CODE . CONNETION . MATERIAL

Example: 3B TF 06 . 060 . 014T . 3 Type 3B TF with mentioned Q(lpm)@P(bar), Spray angle: 60°, 1/4" BSPT, S.S.316



3S R

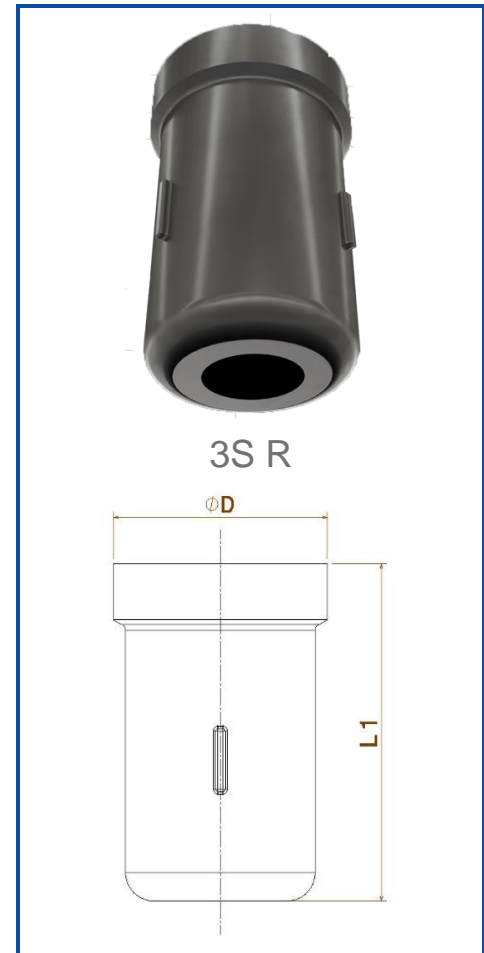
Extra-Large Flow Passage Nozzle

Applications:

- Cooling for steel plants
- Process cooling for food, chemical, and industrial processes
- Fire protection
- Quenching
- Scrubbing

Properties:

- Extra-large flow passages and large open orifice eliminating clogging
- Internal vane is cast as part of the nozzle
- Operating pressures up to 4 bar (full cone pattern develops at 0.7 bar)
- Female Connection

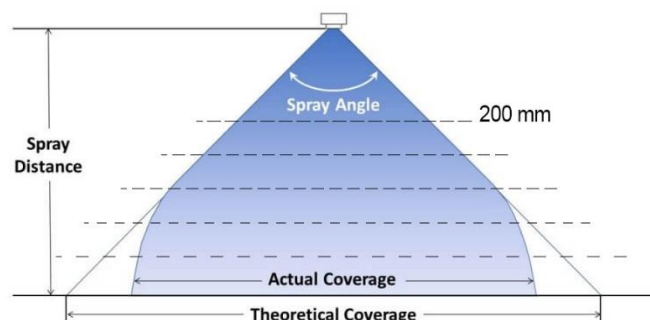


Size	Conn. code			Dimensions [mm]		Weight (kg) (metal)
	BSPT	BSPP	NPT	L ₁	D	
2"	200T	200P	200N	112.7	74.6	1.36
2 1/2"	212T	212P	212N	138.9	88.1	2.49
3"	300T	300P	300N	165.1	104.8	3.40
4"	400T	400P	400N	206.4	127.0	6.12
5"	500T	500P	500N	254.8	161.9	14.97
6"	600T	600P	600N	300.0	193.7	17.46
8"	800T	800P	800N	388.9	241.3	34.02

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage
	@ 200 mm
50°	180
65°	250
80°	320
95°	420



Order No.: **CODE . CONNETION . MATERIAL**

Example: 3S R 45 . 050 . 200T . 3 Type 3S R with mentioned Q(lpm)@P(bar), Spray angle: 50°, 2" BSPT, S.S.316

Extra-Large Flow Passage Full-Cone Spray Nozzles Spadflow Series 3S R

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+ STP



Spray angle (α)	Code	Connection** [inch]	Flow rate [l/min]							
			P [bar]							
			0.1	0.2	0.4	0.5	0.7	1.5	3	4
50°	3S R 45 . 050	2"	122	168	231	256	298	424	583	665
	3S R 70 . 050	2 1/2"	190	261	359	398	464	659	907	1035
	3S R 110 . 050	3"	298	410	564	625	730	1036	1425	1627
	3S R 160 . 050	4"	434	596	820	909	1061	1507	2073	2366
	3S R 190 . 050	4"	515	708	974	1079	1260	1789	2461	2809
	3S R 250 . 050	5"	677	932	1282	1420	1658	2354	3238	3697
	3S R 280 . 050	5"	759	1044	1436	1591	1857	2637	3627	4140
	3S R 360 . 050	6"	975	1342	1846	2045	2388	3390	4663	5323
	3S R 400 . 050	6"	1084	1491	2051	2273	2653	3767	5181	5915
	3S R 650 . 050	8"	1761	2423	3333	3693	4311	6121	8420	9611
3S R 750 . 050	8"	2032	2795	3845	4261	4974	7063	9715	11090	
65°	3S R 45 . 065	2"	122	168	231	256	298	424	583	665
	3S R 60 . 065	2"	163	224	308	341	398	565	777	887
	3S R 70 . 065	2 1/2"	190	261	359	398	464	659	907	1035
	3S R 90 . 065	2 1/2"	244	335	461	511	597	848	1166	1331
	3S R 110 . 065	3"	298	410	564	625	730	1036	1425	1627
	3S R 140 . 065	3"	379	522	718	795	929	1318	1814	2070
	3S R 160 . 065	4"	434	596	820	909	1061	1507	2073	2366
	3S R 190 . 065	4"	515	708	974	1079	1260	1789	2461	2809
	3S R 250 . 065	4" – 5"	677	932	1282	1420	1658	2354	3238	3697
	3S R 280 . 065	5"	759	1044	1436	1591	1857	2637	3627	4140
	3S R 360 . 065	6"	975	1342	1846	2045	2388	3390	4663	5323
	3S R 380 . 065	5"	1030	1416	1948	2159	2520	3579	4922	5619
	3S R 400 . 065	6"	1084	1491	2051	2273	2653	3767	5181	5915
	3S R 560 . 065	6"	1517	2087	2871	3182	3714	5274	7254	8280
	3S R 650 . 065	8"	1761	2423	3333	3693	4311	6121	8420	9611
3S R 750 . 065	8"	2032	2795	3845	4261	4974	7063	9715	11090	
3S R 850 . 065	8"	2303	3168	4358	4829	5637	8005	11011	12569	
80°	3S R 160 . 080	4"	434	596	820	909	1061	1507	2073	2366
	3S R 250 . 080	5"	677	932	1282	1420	1658	2354	3238	3697
	3S R 360 . 080	6"	975	1342	1846	2045	2388	3390	4663	5323
	3S R 650 . 080	8"	1761	2423	3333	3693	4311	6121	8420	9611
95°	3S R 45 . 095	2"	122	168	231	256	298	424	583	665
	3S R 60 . 095	2"	163	224	308	341	398	565	777	887
	3S R 70 . 095	2 1/2"	190	261	359	398	464	659	907	1035
	3S R 90 . 095	2 1/2"	244	335	461	511	597	848	1166	1331
	3S R 110 . 095	3"	298	410	564	625	730	1036	1425	1627
	3S R 140 . 095	3"	379	522	718	795	929	1318	1814	2070
	3S R 190 . 095	4"	515	708	974	1079	1260	1789	2461	2809
	3S R 250 . 095	4"	677	932	1282	1420	1658	2354	3238	3697
	3S R 280 . 095	5"	759	1044	1436	1591	1857	2637	3627	4140
	3S R 380 . 095	5"	1030	1416	1948	2159	2520	3579	4922	5619
	3S R 400 . 095	6"	1084	1491	2051	2273	2653	3767	5181	5915
	3S R 560 . 095	6"	1517	2087	2871	3182	3714	5274	7254	8280
	3S R 750 . 095	8"	2032	2795	3845	4261	4974	7063	9715	11090
	3S R 850 . 095	8"	2303	3168	4358	4829	5637	8005	11011	12569
	3S R 1000 . 095	8"	2710	3727	5127	5681	6632	9417	12954	14787

** Different connection sizes are available upon request

Order No.: CODE . CONNETION . MATERIAL

Example: 3S R 45 . 050 . 200T . 3 Type 3S R with mentioned Q(lpm)@P(bar), Spray angle: 50°, 2" BSPT, S.S.316



3B MP

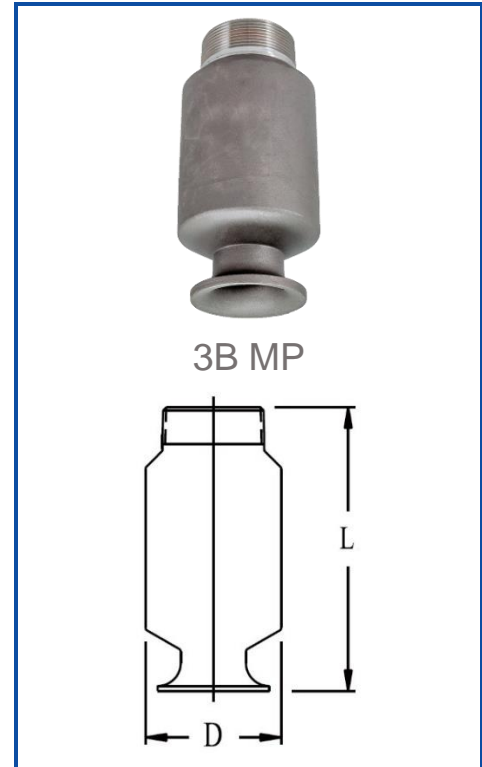
Extra-Large Flow Passage Full-Cone Nozzle

Applications:

- Cooling for steel plants
- Washing
- Process cooling for food, chemical, and industrial processes
- Evaporate tailing ponds or volatile waste
- Fire protection
- Quenching
- Gas scrubbing
- Distribute slurry in open towers

Properties:

- Extra-large flow passages and large open orifice eliminating clogging
- Two unique S-shaped internal vanes allow free passage of particles
- High energy efficiency

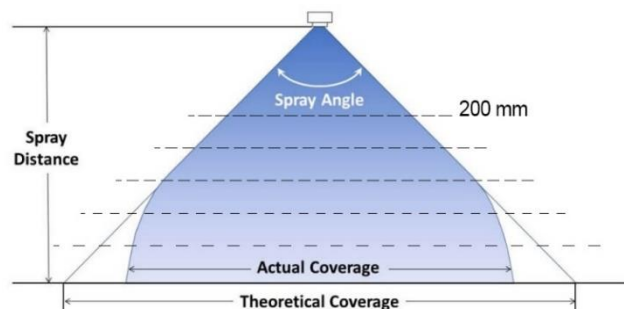


Nozzle Code	Size	Conn. code			L	D	Weight (kg) (metal)
		BSPT	BSPP	NPT			
3B MP 750 . 120	2"	200T	200P	200N	159	66.8	1.59
3B MP 812 . 120	2"	200T	200P	200N	159	66.8	1.59
3B MP 875 . 120	2"	200T	200P	200N	159	66.8	1.59
3B MP 937 . 120	2"	200T	200P	200N	165	82.6	1.70
3B MP 1000 . 120	2"	200T	200P	200N	171	82.6	1.70
3B MP 1000 . 120	2 1/2"	212T	212P	212N	168	82.6	1.70
3B MP 1125 . 120	2"	200T	200P	200N	171	82.6	2.04
3B MP 1125 . 120	2 1/2"	212T	212P	212N	178	82.6	2.04
3B MP 1250 . 120	2 1/2"	212T	212P	212N	181	82.6	2.04
3B MP 1375 . 120	2 1/2"	212T	212P	212N	229	102	2.84
3B MP 1500 . 120	2 1/2"	212T	212P	212N	229	102	2.84
3B MP 1500 . 120	3"	300T	300P	300N	248	121	3.29
3B MP 1625 . 120	3"	300T	300P	300N	251	121	3.29
3B MP 1750 . 120	3"	300T	300P	300N	251	121	3.29
3B MP 1750 . 120	4"	400T	400P	400N	248	121	3.63
3B MP 1875 . 120	4"	400T	400P	400N	248	121	3.63
3B MP 2000 . 120	4"	400T	400P	400N	311	152	7.26
3B MP 2125 . 120	4"	400T	400P	400N	311	152	7.26
3B MP 2250 . 120	4"	400T	400P	400N	311	152	7.26

Material*	Code
Brass	1
S.S.304	2
S.S.316	3

* Different materials are available upon request

α	Spray coverage
	@ 200 mm
120°	692



Order No.: CODE . CONNETION . MATERIAL

Example: 3B MP 750 . 120 . 200T . 3 Type 3B MP with mentioned Q(lpm)@P(bar), Spray angle: 120°, 2" BSPT, S.S.316

Extra-Large Flow Passage **Full-Cone** Spray Nozzles
Spadflow Series **3B MP**

Webpage
+ STP



3B MP

Spray angle (α)	Code	Connection** [inch]	Flow rate [l/min]							
			P [bar]							
			0.2	0.3	0.5	0.7	1 K factor	2	3	5
120°	3B MP 750 . 120	2"	94.8	115	146	171	202	280	339	430
	3B MP 812 . 120	2"	104	126	160	187	221	306	370	471
	3B MP 875 . 120	2"	129	155	197	231	273	378	458	582
	3B MP 937 . 120	2"	144	174	221	259	306	424	513	652
	3B MP 1000 . 120	2" – 2 1/2"	168	203	259	303	358	496	600	763
	3B MP 1125 . 120	2" – 2 1/2"	206	249	317	371	439	608	736	935
	3B MP 1250 . 120	2 1/2"	247	299	381	446	527	730	883	1120
	3B MP 1375 . 120	2 1/2"	297	359	456	535	632	875	1060	1350
	3B MP 1500 . 120	2 1/2" – 3"	363	440	559	655	774	1070	1230	1650
	3B MP 1625 . 120	3"	428	517	658	770	911	1260	1530	1940
	3B MP 1750 . 120	3" – 4"	488	591	751	880	1040	1440	1740	2220
	3B MP 1875 . 120	4"	549	664	845	989	1,170	1,620	1,960	2,490
	3B MP 2000 . 120	4"	643	778	989	1160	1370	1900	2300	2920
	3B MP 2125 . 120	4"	718	869	1100	1290	1530	2120	2560	3260
3B MP 2250 . 120	4"	779	943	1200	1,400	1,660	2,300	2,780	3,540	

** Different connection sizes are available upon request

Order No.: **CODE . CONNETION . MATERIAL**

Example: 3B MP 750 . 120 . 200T . 3 Type 3B MP with mentioned Q(lpm)@P(bar), Spray angle: 120°, 2" BSPT, S.S.316