UNIVERSAL APPLICATION RATE CHART FOR 25 CM TIP SPACING

TIP CAPACITY	LIQUID PRESSURE IN bar	CAPACITY ONE NOZZLE IN l/min	l/ha – 25 cm NOZZLE SPACING											
			4 km/h	6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h	25 km/h	30 km/h	35 km/h
01	1.0	0.23	138	92.0	69.0	55.2	46.0	39.4	34.5	30.7	27.6	22.1	18.4	15.8
	1.5	0.28	168	112	84.0	67.2	56.0	48.0	42.0	37.3	33.6	26.9	22.4	19.2
	2.0	0.32	192	128	96.0	76.8	64.0	54.9	48.0	42.7	38.4	30.7	25.6	21.9
	3.0	0.39	234	156	117	93.6	78.0	66.9	58.5	52.0	46.8	37.4	31.2	26.7
	4.0	0.45	270	180	135	108	90.0	77.1	67.5	60.0	54.0	43.2	36.0	30.9
	5.0	0.50	300	200	150	120	100	85.7	75.0	66.7	60.0	48.0	40.0	34.3
	6.0	0.55	330	220	165	132	110	94.3	82.5	73.3	66.0	52.8	44.0	37.7
	7.0	0.60	360	240	180	144	120	103	90.0	80.0	72.0	57.6	48.0	41.1
015	1.0	0.34	204	136	102	81.6	68.0	58.3	51.0	45.3	40.8	32.6	27.2	23.3
	1.5	0.42	252	168	126	101	84.0	72.0	63.0	56.0	50.4	40.3	33.6	28.8
	2.0	0.48	288	192	144	115	96.0	82.3	72.0	64.0	57.6	46.1	38.4	32.9
	3.0	0.59	354	236	177	142	118	101	88.5	78.7	70.8	56.6	47.2	40.5
	4.0	0.68	408	272	204	163	136	117	102	90.7	81.6	65.3	54.4	46.6
	5.0	0.76	456	304	228	182	152	130	114	101	91.2	73.0	60.8	52.1
	6.0	0.83	498	332	249	199	166	142	125	111	99.6	79.7	66.4	56.9
	7.0	0.90	540	360	270	216	180	154	135	120	108	86.4	72.0	61.7
02	1.0	0.46	276	184	138	110	92.0	78.9	69.0	61.3	55.2	44.2	36.8	31.5
	1.5	0.56	336	224	168	134	112	96.0	84.0	74.7	67.2	53.8	44.8	38.4
	2.0	0.65	390	260	195	156	130	111	97.5	86.7	78.0	62.4	52.0	44.6
	3.0	0.79	474	316	237	190	158	135	119	105	94.8	75.8	63.2	54.2
	4.0	0.91	546	364	273	218	182	156	137	121	109	87.4	72.8	62.4
	5.0	1.02	612	408	306	245	204	175	153	136	122	97.9	81.6	69.9
	6.0	1.12	672	448	336	269	224	192	168	149	134	108	89.6	76.8
	7.0	1.21	726	484	363	290	242	207	182	161	145	116	96.8	83.0
025	1.0	0.57	342	228	171	137	114	97.7	85.5	76.0	68.4	54.7	45.6	39.1
	1.5	0.70	420	280	210	168	140	120	105	93.3	84.0	67.2	56.0	48.0
	2.0	0.81	486	324	243	194	162	139	122	108	97.2	77.8	64.8	55.5
	3.0	0.99	594	396	297	238	198	170	149	132	119	95.0	79.2	67.9
	4.0	1.14	684	456	342	274	228	195	171	152	137	109	91.2	78.2
	5.0	1.28	768	512	384	307	256	219	192	171	154	123	102	87.8
	6.0	1.40	840	560	420	336	280	240	210	187	168	134	112	96.0
	7.0	1.51	906	604	453	362	302	259	227	201	181	145	121	104
03	1.0	0.68	408	272	204	163	136	117	102	90.7	81.6	65.3	54.4	46.6
	1.5	0.83	498	332	249	199	166	142	125	111	99.6	79.7	66.4	56.9
	2.0	0.96	576	384	288	230	192	165	144	128	115	92.2	76.8	65.8
	3.0	1.18	708	472	354	283	236	202	177	157	142	113	94.4	80.9
	4.0	1.36	816	544	408	326	272	233	204	181	163	131	109	93.3
	5.0	1.52	912	608	456	365	304	261	228	203	182	146	122	104
	6.0	1.67	1002	668	501	401	334	286	251	223	200	160	134	115
	7.0	1.80	1080	720	540	432	360	309	270	240	216	173	144	123
035	1.0	0.80	480	320	240	192	160	137	120	107	96.0	76.8	64.0	54.9
	1.5	0.98	588	392	294	235	196	168	147	131	118	94.1	78.4	67.2
	2.0	1.13	678	452	339	271	226	194	170	151	136	108	90.4	77.5
	3.0	1.38	828	552	414	331	276	237	207	184	166	132	110	94.6
	4.0	1.59	954	636	477	382	318	273	239	212	191	153	127	109
	5.0	1.78	1068	712	534	427	356	305	267	237	214	171	142	122
	6.0	1.95	1170	780	585	468	390	334	293	260	234	187	156	134
	7.0	2.11	1266	844	633	506	422	362	317	281	253	203	169	145
04	1.0	0.91	546	364	273	218	182	156	137	121	109	87.4	72.8	62.4
	1.5	1.12	672	448	336	269	224	192	168	149	134	108	89.6	76.8
	2.0	1.29	774	516	387	310	258	221	194	172	155	124	103	88.5
	3.0	1.58	948	632	474	379	316	271	237	211	190	152	126	108
	4.0	1.82	1092	728	546	437	364	312	273	243	218	175	146	125
	5.0	2.04	1224	816	612	490	408	350	306	272	245	196	163	140
	6.0	2.23	1338	892	669	535	446	382	335	297	268	214	178	153
	7.0	2.41	1446	964	723	578	482	413	362	321	289	231	193	165
05	1.0	1.14	684	456	342	274	228	195	171	152	137	109	91.2	78.2
	1.5	1.39	834	556	417	334	278	238	209	185	167	133	111	95.3
	2.0	1.61	966	644	483	386	322	276	242	215	193	155	129	110
	3.0	1.97	1182	788	591	473	394	338	296	263	236	189	158	135
	4.0	2.27	1362	908	681	545	454	389	341	303	272	218	182	156
	5.0	2.54	1524	1016	762	610	508	435	381	339	305	244	203	174
	6.0	2.79	1674	1116	837	670	558	478	419	372	335	268	223	191
	7.0	3.01	1806	1204	903	722	602	516	452	401	361	289	241	206
06	1.0	1.37	822	548	411	329	274	235	206	183	164	132	110	93.9
	1.5	1.68	1008	672	504	403	336	288	252	224	202	161	134	115
	2.0	1.94	1164	776	582	466	388	333	291	259	233	186	155	133
	3.0	2.37	1422	948	711	569	474	406	356	316	284	228	190	163
	4.0	2.74	1644	1096	822	658	548	470	411	365	329	263	219	188
	5.0	3.06	1836	1224	918	734	612	525	459	408	367	294	245	210
	6.0	3.35	2010	1340	1005	804	670	574	503	447	402	322	268	230
	7.0	3.62	2172	1448	1086	869	724	621	543	483	434	348	290	248
08	1.0	1.82	1092	728	546	437	364	312	273	243	218	175	146	125
	1.5	2.23	1338	892	669	535	446	382	335	297	268	214	178	153
	2.0	2.58	1548	1032	774	619	516	442	387	344	310	248	206	177
	3.0	3.16	1896	1264	948	758	632	542	474	421	379	303	253	217
	4.0	3.65	2190	1460	1095	876	730	626	548	487	438	350	292	250
	5.0	4.08	2448	1632	1224	979	816	699	612	544	490	392	326	280
	6.0	4.47	2682	1788	1341	1073	894	766	671	596	536	429	358	307
	7.0	4.83	2898	1932	1449	1159	966	828	725	644	580	464	386	331
10	1.0	2.28	1368	912	684	547	456	391	342	304	274	219	182	156
	1.5	2.79	1674	1116	837	670	558	478	419	372	335	268	223	191
	2.0	3.23	1938	1292	969	775	646	554	485	431	388	310	258	221
	3.0	3.95	2370	1580	1185	948	790	677	593	527	474	379	316	271
	4.0	4.56	2736	1824	1368	1094	912	782	684	608	547	438	365	313
	5.0	5.10	3060	2040	1530	1224	1020	874	765	680	612	490	408	350
	6.0	5.59	3354	2236	1677	1342	1118	958	839	745	671	537	447	383
	7.0	6.03	3618	2412	1809	1447	1206	1034	905	804	724	579	482	413
12	1.0	2.73	1638	1092	819	655	546	468	410	364	328	262	218	187
	1.5	3.34	2004	1336	1002	802	668	573	501	445	401	321	267	229
	2.0	3.86	2316	1544	1158	926	772	662	579	515	463	371	309	265
	3.0	4.73	2838	1892	1419	1135	946	811	710	631	568	454	378	324
	4.0	5.46	3276	2184	1638	1310	1092	936	819	728	655	524	437	374
	5.0	6.11	3666	2444	1833	1466	1222	1047	917	815	733	587	489	419
	6.0	6.69	4014	2676	2007	1606	1338	1147	1004	892	803	642	535	459
	7.0	7.23	4338	2892	2169	1735	1446	1239	1085	964	868	694	578	496
15	1.0	3.42	2052	1368	1026	821	684	586	513	456	410	328	274	235
	1.5	4.19	2514	1676	1257	1006	838	718	629	559	503	402	335	287
	2.0	4.83	2898	1932	1449	1159	966	828	725	644	580	464	386	331
	3.0	5.92	3552	2368	1776	1421	1184	1015	888	789	710	568	474	406
	4.0	6.84	4104	2736	2052	1642	1368	1173	1026	912	821	657	547	469
	5.0	7.64	4584	3056	2292	1834	1528	1310	1146	1019	917	733	611	524
	6.0	8.37	5022	3348	2511	2009	1674	1435	1256	1116	1004	804	670	574
	7.0	9.04	5424	3616	2712	2170	1808	1550	1356	1205	1085	868	723	620
20	1.0	4.56	2736	1824	1368	1094	912	782	684	608	547	438	365	313
	1.5	5.58	3348	2232	1674	1339	1116	957	837	744	670	536	446	383
	2.0	6.44	3864	2576	1932	1546	1288	1104	966	859	773	618	515	442
	3.0	7.89	4734	3156	2367	1894	1578	1353	1184	1052	947	757	631	541
	4.0	9.11	5466	3644	2733	2186	1822	1562	1367	1215	1093	875	729	625
	5.0	10.19	6114	4076	3057	2446	2038	1747	1529	1359	1223	978	815	699
	6.0	11.16	6696	4464	3348	2678	2232	1913	1674	1488	1339	1071	893	765
	7.0	12.05	7230	4820	3615	2892	2410	2066	1808	1607	1446	1157	964	826

Note: Always double check your application rates. Tabulations are based on spraying water at 21°C.

UNIVERSAL APPLICATION RATE CHART FOR 35 CM TIP SPACING

TIP CAPACITY	LIQUID PRESSURE IN bar	CAPACITY ONE NOZZLE IN l/min	l/ha – 35 cm NOZZLE SPACING											
			4 km/h	6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h	25 km/h	30 km/h	35 km/h
01	1.0	0.23	98.6	65.7	49.3	39.4	32.9	28.2	24.6	21.9	19.7	15.8	13.1	11.3
	1.5	0.28	120	80.0	60.0	48.0	40.0	34.3	30.0	26.7	24.0	19.2	16.0	13.7
	2.0	0.32	137	91.4	68.6	54.9	45.7	39.2	34.3	30.5	27.4	21.9	18.3	15.7
	3.0	0.39	167	111	83.6	66.9	55.7	47.8	41.8	37.1	33.4	26.7	22.3	19.1
	4.0	0.45	193	129	96.4	77.1	64.3	55.1	48.2	42.9	38.6	30.9	25.7	22.0
	5.0	0.50	214	143	107	85.7	71.4	61.2	53.6	47.6	42.9	34.3	28.6	24.5
	6.0	0.55	236	157	118	94.3	78.6	67.3	58.9	52.4	47.1	37.7	31.4	26.9
	7.0	0.60	257	171	129	103	85.7	73.5	64.3	57.1	51.4	41.1	34.3	29.4
015	1.0	0.34	146	97.1	72.9	58.3	48.6	41.6	36.4	32.4	29.1	23.3	19.4	16.7
	1.5	0.42	180	120	90.0	72.0	60.0	51.4	45.0	40.0	36.0	28.8	24.0	20.6
	2.0	0.48	206	137	103	82.3	68.6	58.8	51.4	45.7	41.1	32.9	27.4	23.5
	3.0	0.59	253	169	126	101	84.3	72.2	63.2	56.2	50.6	40.5	33.7	28.9
	4.0	0.68	291	194	146	117	97.1	83.3	72.9	64.8	58.3	46.6	38.9	33.3
	5.0	0.76	326	217	163	130	109	93.1	81.4	72.4	65.1	52.1	43.4	37.2
	6.0	0.83	356	237	178	142	119	102	88.9	79.0	71.1	56.9	47.4	40.7
	7.0	0.90	386	257	193	154	129	110	96.4	85.7	77.1	61.7	51.4	44.1
02	1.0	0.46	197	131	98.6	78.9	65.7	56.3	49.3	43.8	39.4	31.5	26.3	22.5
	1.5	0.56	240	160	120	96.0	80.0	68.6	60.0	53.3	48.0	38.4	32.0	27.4
	2.0	0.65	279	186	139	111	92.9	79.6	69.6	61.9	55.7	44.6	37.1	31.8
	3.0	0.79	339	226	169	135	113	96.7	84.6	75.2	67.7	54.2	45.1	38.7
	4.0	0.91	390	260	195	156	130	111	97.5	86.7	78.0	62.4	52.0	44.6
	5.0	1.02	437	291	219	175	146	125	109	97.1	87.4	69.9	58.3	50.0
	6.0	1.12	480	320	240	192	160	137	120	107	96.0	76.8	64.0	54.9
	7.0	1.21	519	346	259	207	173	148	130	115	104	83.0	69.1	59.3
025	1.0	0.57	244	163	122	97.7	81.4	69.8	61.1	54.3	48.9	39.1	32.6	27.9
	1.5	0.70	300	200	150	120	100	85.7	75.0	66.7	60.0	48.0	40.0	34.3
	2.0	0.81	347	231	174	139	116	99.2	86.8	77.1	69.4	55.5	46.3	39.7
	3.0	0.99	424	283	212	170	141	121	106	94.3	84.9	67.9	56.6	48.5
	4.0	1.14	489	326	244	195	163	140	122	109	97.7	78.2	65.1	55.8
	5.0	1.28	549	366	274	219	183	157	137	122	110	87.8	73.1	62.7
	6.0	1.40	600	400	300	240	200	171	150	133	120	96.0	80.0	68.6
	7.0	1.51	647	431	324	259	216	185	162	144	129	104	86.3	74.0
03	1.0	0.68	291	194	146	117	97.1	83.3	72.9	64.8	58.3	46.6	38.9	33.3
	1.5	0.83	356	237	178	142	119	102	88.9	79.0	71.1	56.9	47.4	40.7
	2.0	0.96	411	274	206	165	137	118	103	91.4	82.3	65.8	54.9	47.0
	3.0	1.18	506	337	253	202	169	144	126	112	101	80.9	67.4	57.8
	4.0	1.36	583	389	291	233	194	167	146	130	117	93.3	77.7	66.6
	5.0	1.52	651	434	326	261	217	186	163	145	130	104	86.9	74.4
	6.0	1.67	716	477	358	286	239	204	179	159	143	115	95.4	81.8
	7.0	1.80	771	514	386	309	257	220	193	171	154	123	103	88.2
035	1.0	0.80	343	229	171	137	114	98.0	85.7	76.2	68.6	54.9	45.7	39.2
	1.5	0.98	420	280	210	168	140	120	105	93.3	84.0	67.2	56.0	48.0
	2.0	1.13	484	323	242	194	161	138	121	108	96.9	77.5	64.6	55.3
	3.0	1.38	591	394	296	237	197	169	148	131	118	94.6	78.9	67.6
	4.0	1.59	681	454	341	273	227	195	170	151	136	109	90.9	77.9
	5.0	1.78	763	509	381	305	254	218	191	170	153	122	102	87.2
	6.0	1.95	836	557	418	334	279	239	209	186	167	134	111	95.5
	7.0	2.11	904	603	452	362	301	258	226	201	181	145	121	103
04	1.0	0.91	390	260	195	156	130	111	97.5	86.7	78.0	62.4	52.0	44.6
	1.5	1.12	480	320	240	192	160	137	120	107	96.0	76.8	64.0	54.9
	2.0	1.29	553	369	276	221	184	158	138	123	111	88.5	73.7	63.2
	3.0	1.58	677	451	339	271	226	193	169	150	135	108	90.3	77.4
	4.0	1.82	780	520	390	312	260	223	195	173	156	125	104	89.1
	5.0	2.04	874	583	437	350	291	250	219	194	175	140	117	99.9
	6.0	2.23	956	637	478	382	319	273	239	212	191	153	127	109
	7.0	2.41	1033	689	516	413	344	295	258	230	207	165	138	118
05	1.0	1.14	489	326	244	195	163	140	122	109	97.7	78.2	65.1	55.8
	1.5	1.39	596	397	298	238	199	170	149	132	119	95.3	79.4	68.1
	2.0	1.61	690	460	345	276	230	197	173	153	138	110	92.0	78.9
	3.0	1.97	844	563	422	338	281	241	211	188	169	135	113	96.5
	4.0	2.27	973	649	486	389	324	278	243	216	195	156	130	111
	5.0	2.54	1089	726	544	435	363	311	272	242	218	174	145	124
	6.0	2.79	1196	797	598	478	399	342	299	266	239	191	159	137
	7.0	3.01	1290	860	645	516	430	369	323	287	258	206	172	147
06	1.0	1.37	587	391	294	235	196	168	147	130	117	93.9	78.3	67.1
	1.5	1.68	720	480	360	288	240	206	180	160	144	115	96.0	82.3
	2.0	1.94	831	554	416	333	277	238	208	185	166	133	111	95.0
	3.0	2.37	1016	677	508	406	339	290	254	226	203	163	135	116
	4.0	2.74	1174	783	587	470	391	336	294	261	235	188	157	134
	5.0	3.06	1311	874	656	525	437	375	328	291	262	210	175	150
	6.0	3.35	1436	957	718	574	479	410	359	319	287	230	191	164
	7.0	3.62	1551	1034	776	621	517	443	388	345	310	248	207	177
08	1.0	1.82	780	520	390	312	260	223	195	173	156	125	104	89.1
	1.5	2.23	956	637	478	382	319	273	239	212	191	153	127	109
	2.0	2.58	1106	737	553	442	369	316	276	246	221	177	147	126
	3.0	3.16	1354	903	677	542	451	387	339	301	271	217	181	155
	4.0	3.65	1564	1043	782	626	521	447	391	348	313	250	209	179
	5.0	4.08	1749	1166	874	699	583	500	437	389	350	280	233	200
	6.0	4.47	1916	1277	958	766	639	547	479	426	383	307	255	219
	7.0	4.83	2070	1380	1035	828	690	591	518	460	414	331	276	237
10	1.0	2.28	977	651	489	391	326	279	244	217	195	156	130	112
	1.5	2.79	1196	797	598	478	399	342	299	266	239	191	159	137
	2.0	3.23	1384	923	692	554	461	396	346	308	277	221	185	158
	3.0	3.95	1693	1129	846	677	564	484	423	376	339	271	226	193
	4.0	4.56	1954	1303	977	782	651	558	489	434	391	313	261	223
	5.0	5.10	2186	1457	1093	874	729	624	546	486	437	350	291	250
	6.0	5.59	2396	1597	1198	958	799	684	599	532	479	383	319	274
	7.0	6.03	2584	1723	1292	1034	861	738	646	574	517	413	345	295
12	1.0	2.73	1170	780	585	468	390	334	293	260	234	187	156	134
	1.5	3.34	1431	954	716	573	477	409	358	318	286	229	191	164
	2.0	3.86	1654	1103	827	662	551	473	414	368	331	265	221	189
	3.0	4.73	2027	1351	1014	811	676	579	507	450	405	324	270	232
	4.0	5.46	2340	1560	1170	936	780	669	585	520	468	374	312	267
	5.0	6.11	2619	1746	1309	1047	873	748	655	582	524	419	349	299
	6.0	6.69	2867	1911	1434	1147	956	819	717	637	573	459	382	328
	7.0	7.23	3099	2066	1549	1239	1033	885	775	689	620	496	413	354
15	1.0	3.42	1466	977	733	586	489	419	366	326	293	235	195	168
	1.5	4.19	1796	1197	898	718	599	513	449	399	359	287	239	205
	2.0	4.83	2070	1380	1035	828	690	591	518	460	414	331	276	237
	3.0	5.92	2537	1691	1269	1015	846	725	634	564	507	406	338	290
	4.0	6.84	2931	1954	1466	1173	977	838	733	651	586	469	391	335
	5.0	7.64	3274	2183	1637	1310	1091	936	819	728	655	524	437	374
	6.0	8.37	3587	2391	1794	1435	1196	1025	897	797	717	574	478	410
	7.0	9.04	3874	2583	1937	1550	1291	1107	969	861	775	620	517	443
20	1.0	4.56	1954	1303	977	782	651	558	489	434	391	313	261	223
	1.5	5.58	2391	1594	1196	957	797	683	598	531	478	383	319	273
	2.0	6.44	2760	1840	1380	1104	920	789	690	613	552	442	368	315
	3.0	7.89	3381	2254	1691	1353	1127	966	845	751	676	541	451	386
	4.0	9.11	3904	2603	1952	1562	1301	1116	976	868	781	625	521	446
	5.0	10.19	4367	2911	2184	1747	1456	1248	1092	970	873	699	582	499
	6.0	11.16	4783	3189	2391	1913	1594	1367	1196	1063	957	765	638	547
	7.0	12.05	5164	3443	2582	2066	1721	1476	1291	1148	1033	826	689	590

Note: Always double check your application rates. Tabulations are based on spraying water at 21°C.

UNIVERSAL APPLICATION RATE CHART FOR 50 CM TIP SPACING

TIP CAPACITY	LIQUID PRESSURE IN bar	CAPACITY 1 NOZZLE IN l/min	l/ha – 50 cm NOZZLE SPACING											
			4 km/h	6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h	25 km/h	30 km/h	35 km/h
01	1.0	0.23	69.0	46.0	34.5	27.6	23.0	19.7	17.3	15.3	13.8	11.0	9.2	7.9
	1.5	0.28	84.0	56.0	42.0	33.6	28.0	24.0	21.0	18.7	16.8	13.4	11.2	9.6
	2.0	0.32	96.0	64.0	48.0	38.4	32.0	27.4	24.0	21.3	19.2	15.4	12.8	11.0
	3.0	0.39	117	78.0	58.5	46.8	39.0	33.4	29.3	26.0	23.4	18.7	15.6	13.4
	4.0	0.45	135	90.0	67.5	54.0	45.0	38.6	33.8	30.0	27.0	21.6	18.0	15.4
	5.0	0.50	150	100	75.0	60.0	50.0	42.9	37.5	33.3	30.0	24.0	20.0	17.1
	6.0	0.55	165	110	82.5	66.0	55.0	47.1	41.3	36.7	33.0	26.4	22.0	18.9
	7.0	0.60	180	120	90.0	72.0	60.0	51.4	45.0	40.0	36.0	28.8	24.0	20.6
015	1.0	0.34	102	68.0	51.0	40.8	34.0	29.1	25.5	22.7	20.4	16.3	13.6	11.7
	1.5	0.42	126	84.0	63.0	50.4	42.0	36.0	31.5	28.0	25.2	20.2	16.8	14.4
	2.0	0.48	144	96.0	72.0	57.6	48.0	41.1	36.0	32.0	28.8	23.0	19.2	16.5
	3.0	0.59	177	118	88.5	70.8	59.0	50.6	44.3	39.3	35.4	28.3	23.6	20.2
	4.0	0.68	204	136	102	81.6	68.0	58.3	51.0	45.3	40.8	32.6	27.2	23.3
	5.0	0.76	228	152	114	91.2	76.0	65.1	57.0	50.7	45.6	36.5	30.4	26.1
	6.0	0.83	249	166	125	99.6	83.0	71.1	62.3	55.3	49.8	39.8	33.2	28.5
	7.0	0.90	270	180	135	108	90.0	77.1	67.5	60.0	54.0	43.2	36.0	30.9
02	1.0	0.46	138	92.0	69.0	55.2	46.0	39.4	34.5	30.7	27.6	22.1	18.4	15.8
	1.5	0.56	168	112	84.0	67.2	56.0	48.0	42.0	37.3	33.6	26.9	22.4	19.2
	2.0	0.65	195	130	97.5	78.0	65.0	55.7	48.8	43.3	39.0	31.2	26.0	22.3
	3.0	0.79	237	158	119	94.8	79.0	67.7	59.3	52.7	47.4	37.9	31.6	27.1
	4.0	0.91	273	182	137	109	91.0	78.0	68.3	60.7	54.6	43.7	36.4	31.2
	5.0	1.02	306	204	153	122	102	87.4	76.5	68.0	61.2	49.0	40.8	35.0
	6.0	1.12	336	224	168	134	112	96.0	84.0	74.7	67.2	53.8	44.8	38.4
	7.0	1.21	363	242	182	145	121	104	90.8	80.7	72.6	58.1	48.4	41.5
025	1.0	0.57	171	114	85.5	68.4	57.0	48.9	42.8	38.0	34.2	27.4	22.8	19.5
	1.5	0.70	210	140	105	84.0	70.0	60.0	52.5	46.7	42.0	33.6	28.0	24.0
	2.0	0.81	243	162	122	97.2	81.0	69.4	60.8	54.0	48.6	38.9	32.4	27.8
	3.0	0.99	297	198	149	119	99.0	84.9	74.3	66.0	59.4	47.5	39.6	33.9
	4.0	1.14	342	228	171	137	114	97.7	85.5	76.0	68.4	54.7	45.6	39.1
	5.0	1.28	384	256	192	154	128	110	96.0	85.3	76.8	61.4	51.2	43.9
	6.0	1.40	420	280	210	168	140	120	105	93.3	84.0	67.2	56.0	48.0
	7.0	1.51	453	302	227	181	151	129	113	101	90.6	72.5	60.4	51.8
03	1.0	0.68	204	136	102	81.6	68.0	58.3	51.0	45.3	40.8	32.6	27.2	23.3
	1.5	0.83	249	166	125	99.6	83.0	71.1	62.3	55.3	49.8	39.8	33.2	28.5
	2.0	0.96	288	192	144	115	96.0	82.3	72.0	64.0	57.6	46.1	38.4	32.9
	3.0	1.18	354	236	177	142	118	101	88.5	78.7	70.8	56.6	47.2	40.5
	4.0	1.36	408	272	204	163	136	117	102	90.7	81.6	65.3	54.4	46.6
	5.0	1.52	456	304	228	182	152	130	114	101	91.2	73.0	60.8	52.1
	6.0	1.67	501	334	251	200	167	143	125	111	100	80.2	66.8	57.3
	7.0	1.80	540	360	270	216	180	154	135	120	108	86.4	72.0	61.7
035	1.0	0.80	240	160	120	96.0	80.0	68.6	60.0	53.3	48.0	38.4	32.0	27.4
	1.5	0.98	294	196	147	118	98.0	84.0	73.5	65.3	58.8	47.0	39.2	33.6
	2.0	1.13	339	226	170	136	113	96.9	84.8	75.3	67.8	54.2	45.2	38.7
	3.0	1.38	414	276	207	166	138	118	104	92.0	82.8	66.2	55.2	47.3
	4.0	1.59	477	318	239	191	159	136	119	106	95.4	76.3	63.6	54.5
	5.0	1.78	534	356	267	214	178	153	134	119	107	85.4	71.2	61.0
	6.0	1.95	585	390	293	234	195	167	146	130	117	93.6	78.0	66.9
	7.0	2.11	633	422	317	253	211	181	158	141	127	101	84.4	72.3
04	1.0	0.91	273	182	137	109	91.0	78.0	68.3	60.7	54.6	43.7	36.4	31.2
	1.5	1.12	336	224	168	134	112	96.0	84.0	74.7	67.2	53.8	44.8	38.4
	2.0	1.29	387	258	194	155	129	111	96.8	86.0	77.4	61.9	51.6	44.2
	3.0	1.58	474	316	237	190	158	135	119	105	94.8	75.8	63.2	54.2
	4.0	1.82	546	364	273	218	182	156	137	121	109	87.4	72.8	62.4
	5.0	2.04	612	408	306	245	204	175	153	136	122	97.9	81.6	69.9
	6.0	2.23	669	446	335	268	223	191	167	149	134	107	89.2	76.5
	7.0	2.41	723	482	362	289	241	207	181	161	145	116	96.4	82.6
05	1.0	1.14	342	228	171	137	114	97.7	85.5	76.0	68.4	54.7	45.6	39.1
	1.5	1.39	417	278	209	167	139	119	104	92.7	83.4	66.7	55.6	47.7
	2.0	1.61	483	322	242	193	161	138	121	107	96.6	77.3	64.4	55.2
	3.0	1.97	591	394	296	236	197	169	148	131	118	94.6	78.8	67.5
	4.0	2.27	681	454	341	272	227	195	170	151	136	109	90.8	77.8
	5.0	2.54	762	508	381	305	254	218	191	169	152	122	102	87.1
	6.0	2.79	837	558	419	335	279	239	209	186	167	134	112	95.7
	7.0	3.01	903	602	452	361	301	258	226	201	181	144	120	103
06	1.0	1.37	411	274	206	164	137	117	103	91.3	82.2	65.8	54.8	47.0
	1.5	1.68	504	336	252	202	168	144	126	112	101	80.6	67.2	57.6
	2.0	1.94	582	388	291	233	194	166	146	129	116	93.1	77.6	66.5
	3.0	2.37	711	474	356	284	237	203	178	158	142	114	94.8	81.3
	4.0	2.74	822	548	411	329	274	235	206	183	164	132	110	93.9
	5.0	3.06	918	612	459	367	306	262	230	204	184	147	122	105
	6.0	3.35	1005	670	503	402	335	287	251	223	201	161	134	115
	7.0	3.62	1086	724	543	434	362	310	272	241	217	174	145	124
08	1.0	1.82	546	364	273	218	182	156	137	121	109	87.4	72.8	62.4
	1.5	2.23	669	446	335	268	223	191	167	149	134	107	89.2	76.5
	2.0	2.58	774	516	387	310	258	221	194	172	155	124	103	88.5
	3.0	3.16	948	632	474	379	316	271	237	211	190	152	126	108
	4.0	3.65	1095	730	548	438	365	313	274	243	219	175	146	125
	5.0	4.08	1224	816	612	490	408	350	306	272	245	196	163	140
	6.0	4.47	1341	894	671	536	447	383	335	298	268	215	179	153
	7.0	4.83	1449	966	725	580	483	414	362	322	290	232	193	166
10	1.0	2.28	684	456	342	274	228	195	171	152	137	109	91.2	78.2
	1.5	2.79	837	558	419	335	279	239	209	186	167	134	112	95.7
	2.0	3.23	969	646	485	388	323	277	242	215	194	155	129	111
	3.0	3.95	1185	790	593	474	395	339	296	263	237	190	158	135
	4.0	4.56	1368	912	684	547	456	391	342	304	274	219	182	156
	5.0	5.10	1530	1020	765	612	510	437	383	340	306	245	204	175
	6.0	5.59	1677	1118	839	671	559	479	419	373	335	268	224	192
	7.0	6.03	1809	1206	905	724	603	517	452	402	362	289	241	207
12	1.0	2.73	819	546	410	328	273	234	205	182	164	131	109	93.6
	1.5	3.34	1002	668	501	401	334	286	251	223	200	160	134	115
	2.0	3.86	1158	772	579	463	386	331	290	257	232	185	154	132
	3.0	4.73	1419	946	710	568	473	405	355	315	284	227	189	162
	4.0	5.46	1638	1092	819	655	546	468	410	364	328	262	218	187
	5.0	6.11	1833	1222	917	733	611	524	458	407	367	293	244	209
	6.0	6.69	2007	1338	1004	803	669	573	502	446	401	321	268	229
	7.0	7.23	2169	1446	1085	868	723	620	542	482	434	347	289	248
15	1.0	3.42	1026	684	513	410	342	293	257	228	205	164	137	117
	1.5	4.19	1257	838	629	503	419	359	314	279	251	201	168	144
	2.0	4.83	1449	966	725	580	483	414	362	322	290	232	193	166
	3.0	5.92	1776	1184	888	710	592	507	444	395	355	284	237	203
	4.0	6.84	2052	1368	1026	821	684	586	513	456	410	328	274	235
	5.0	7.64	2292	1528	1146	917	764	655	573	509	458	367	306	262
	6.0	8.37	2511	1674	1256	1004	837	717	628	558	502	402	335	287
	7.0	9.04	2712	1808	1356	1085	904	775	678	603	542	434	362	310
20	1.0	4.56	1368	912	684	547	456	391	342	304	274	219	182	156
	1.5	5.58	1674	1116	837	670	558	478	419	372	335	268	223	191
	2.0	6.44	1932	1288	966	773	644	552	483	429	386	309	258	221
	3.0	7.89	2367	1578	1184	947	789	676	592	526	473	379	316	271
	4.0	9.11	2733	1822	1367	1093	911	781	683	607	547	437	364	312
	5.0	10.19	3057	2038	1529	1223	1019	873	764	679	611	489	408	349
	6.0	11.16	3348	2232	1674	1339	1116	957	837	744	670	536	446	383
	7.0	12.05	3615	2410	1808	1446	1205	1033	904	803	723	578	482	413

Note: Always double check your application rates. Tabulations are based on spraying water at 21°C.

UNIVERSAL APPLICATION RATE CHART FOR 75 CM TIP SPACING

TIP CAPACITY	LIQUID PRESSURE IN bar	CAPACITY 1 NOZZLE IN l/min	l/ha – 75 cm NOZZLE SPACING											
			4 km/h	6 km/h	8 km/h	10 km/h	12 km/h	14 km/h	16 km/h	18 km/h	20 km/h	25 km/h	30 km/h	35 km/h
01	1.0	0.23	46.0	30.7	23.0	18.4	15.3	13.1	11.5	10.2	9.2	7.4	6.1	5.3
	1.5	0.28	56.0	37.3	28.0	22.4	18.7	16.0	14.0	12.4	11.2	9.0	7.5	6.4
	2.0	0.32	64.0	42.7	32.0	25.6	21.3	18.3	16.0	14.2	12.8	10.2	8.5	7.3
	3.0	0.39	78.0	52.0	39.0	31.2	26.0	22.3	19.5	17.3	15.6	12.5	10.4	8.9
	4.0	0.45	90.0	60.0	45.0	36.0	30.0	25.7	22.5	20.0	18.0	14.4	12.0	10.3
	5.0	0.50	100	66.7	50.0	40.0	33.3	28.6	25.0	22.2	20.0	16.0	13.3	11.4
	6.0	0.55	110	73.3	55.0	44.0	36.7	31.4	27.5	24.4	22.0	17.6	14.7	12.6
	7.0	0.60	120	80.0	60.0	48.0	40.0	34.3	30.0	26.7	24.0	19.2	16.0	13.7
015	1.0	0.34	68.0	45.3	34.0	27.2	22.7	19.4	17.0	15.1	13.6	10.9	9.1	7.8
	1.5	0.42	84.0	56.0	42.0	33.6	28.0	24.0	21.0	18.7	16.8	13.4	11.2	9.6
	2.0	0.48	96.0	64.0	48.0	38.4	32.0	27.4	24.0	21.3	19.2	15.4	12.8	11.0
	3.0	0.59	118	78.7	59.0	47.2	39.3	33.7	29.5	26.2	23.6	18.9	15.7	13.5
	4.0	0.68	136	90.7	68.0	54.4	45.3	38.9	34.0	30.2	27.2	21.8	18.1	15.5
	5.0	0.76	152	101	76.0	60.8	50.7	43.4	38.0	33.8	30.4	24.3	20.3	17.4
	6.0	0.83	166	111	83.0	66.4	55.3	47.4	41.5	36.9	33.2	26.6	22.1	19.0
	7.0	0.90	180	120	90.0	72.0	60.0	51.4	45.0	40.0	36.0	28.8	24.0	20.6
02	1.0	0.46	92.0	61.3	46.0	36.8	30.7	26.3	23.0	20.4	18.4	14.7	12.3	10.5
	1.5	0.56	112	74.7	56.0	44.8	37.3	32.0	28.0	24.9	22.4	17.9	14.9	12.8
	2.0	0.65	130	86.7	65.0	52.0	43.3	37.1	32.5	28.9	26.0	20.8	17.3	14.9
	3.0	0.79	158	105	79.0	63.2	52.7	45.1	39.5	35.1	31.6	25.3	21.1	18.1
	4.0	0.91	182	121	91.0	72.8	60.7	52.0	45.5	40.4	36.4	29.1	24.3	20.8
	5.0	1.02	204	136	102	81.6	68.0	58.3	51.0	45.3	40.8	32.6	27.2	23.3
	6.0	1.12	224	149	112	89.6	74.7	64.0	56.0	49.8	44.8	35.8	29.9	25.6
	7.0	1.21	242	161	121	96.8	80.7	69.1	60.5	53.8	48.4	38.7	32.3	27.7
025	1.0	0.57	114	76.0	57.0	45.6	38.0	32.6	28.5	25.3	22.8	18.2	15.2	13.0
	1.5	0.70	140	93.3	70.0	56.0	46.7	40.0	35.0	31.1	28.0	22.4	18.7	16.0
	2.0	0.81	162	108	81.0	64.8	54.0	46.3	40.5	36.0	32.4	25.9	21.6	18.5
	3.0	0.99	198	132	99.0	79.2	66.0	56.6	49.5	44.0	39.6	31.7	26.4	22.6
	4.0	1.14	228	152	114	91.2	76.0	65.1	57.0	50.7	45.6	36.5	30.4	26.1
	5.0	1.28	256	171	128	102	85.3	73.1	64.0	56.9	51.2	41.0	34.1	29.3
	6.0	1.40	280	187	140	112	93.3	80.0	70.0	62.2	56.0	44.8	37.3	32.0
	7.0	1.51	302	201	151	121	101	86.3	75.5	67.1	60.4	48.3	40.3	34.5
03	1.0	0.68	136	90.7	68.0	54.4	45.3	38.9	34.0	30.2	27.2	21.8	18.1	15.5
	1.5	0.83	166	111	83.0	66.4	55.3	47.4	41.5	36.9	33.2	26.6	22.1	19.0
	2.0	0.96	192	128	96.0	76.8	64.0	54.9	48.0	42.7	38.4	30.7	25.6	21.9
	3.0	1.18	236	157	118	94.4	78.7	67.4	59.0	52.4	47.2	37.8	31.5	27.0
	4.0	1.36	272	181	136	109	90.7	77.7	68.0	60.4	54.4	43.5	36.3	31.1
	5.0	1.52	304	203	152	122	101	86.9	76.0	67.6	60.8	48.6	40.5	34.7
	6.0	1.67	334	223	167	134	111	95.4	83.5	74.2	66.8	53.4	44.5	38.2
	7.0	1.80	360	240	180	144	120	103	90.0	80.0	72.0	57.6	48.0	41.1
035	1.0	0.80	160	107	80.0	64.0	53.3	45.7	40.0	35.6	32.0	25.6	21.3	18.3
	1.5	0.98	196	131	98.0	78.4	65.3	56.0	49.0	43.6	39.2	31.4	26.1	22.4
	2.0	1.13	226	151	113	90.4	75.3	64.6	56.5	50.2	45.2	36.2	30.1	25.8
	3.0	1.38	276	184	138	110	92.0	78.9	69.0	61.3	55.2	44.2	36.8	31.5
	4.0	1.59	318	212	159	127	106	90.9	79.5	70.7	63.6	50.9	42.4	36.3
	5.0	1.78	356	237	178	142	119	102	89.0	79.1	71.2	57.0	47.5	40.7
	6.0	1.95	390	260	195	156	130	111	97.5	86.7	78.0	62.4	52.0	44.6
	7.0	2.11	422	281	211	169	141	121	106	93.8	84.4	67.5	56.3	48.2
04	1.0	0.91	182	121	91.0	72.8	60.7	52.0	45.5	40.4	36.4	29.1	24.3	20.8
	1.5	1.12	224	149	112	89.6	74.7	64.0	56.0	49.8	44.8	35.8	29.9	25.6
	2.0	1.29	258	172	129	103	86.0	73.7	64.5	57.3	51.6	41.3	34.4	29.5
	3.0	1.58	316	211	158	126	105	90.3	79.0	70.2	63.2	50.6	42.1	36.1
	4.0	1.82	364	243	182	146	121	104	91.0	80.9	72.8	58.2	48.5	41.6
	5.0	2.04	408	272	204	163	136	117	102	90.7	81.6	65.3	54.4	46.6
	6.0	2.23	446	297	223	178	149	127	112	99.1	89.2	71.4	59.5	51.0
	7.0	2.41	482	321	241	193	161	138	121	107	96.4	77.1	64.3	55.1
05	1.0	1.14	228	152	114	91.2	76.0	65.1	57.0	50.7	45.6	36.5	30.4	26.1
	1.5	1.39	278	185	139	111	92.7	79.4	69.5	61.8	55.6	44.5	37.1	31.8
	2.0	1.61	322	215	161	129	107	92.0	80.5	71.6	64.4	51.5	42.9	36.8
	3.0	1.97	394	263	197	158	131	113	98.5	87.6	78.8	63.0	52.5	45.0
	4.0	2.27	454	303	227	182	151	130	114	101	90.8	72.6	60.5	51.9
	5.0	2.54	508	339	254	203	169	145	127	113	102	81.3	67.7	58.1
	6.0	2.79	558	372	279	223	186	159	140	124	112	89.3	74.4	63.8
	7.0	3.01	602	401	301	241	201	172	151	134	120	96.3	80.3	68.8
06	1.0	1.37	274	183	137	110	91.3	78.3	68.5	60.9	54.8	43.8	36.5	31.3
	1.5	1.68	336	224	168	134	112	96.0	84.0	74.7	67.2	53.8	44.8	38.4
	2.0	1.94	388	259	194	155	129	111	97.0	86.2	77.6	62.1	51.7	44.3
	3.0	2.37	474	316	237	190	158	135	119	105	94.8	75.8	63.2	54.2
	4.0	2.74	548	365	274	219	183	157	137	122	110	87.7	73.1	62.6
	5.0	3.06	612	408	306	245	204	175	153	136	122	97.9	81.6	69.9
	6.0	3.35	670	447	335	268	223	191	168	149	134	107	89.3	76.6
	7.0	3.62	724	483	362	290	241	207	181	161	145	116	96.5	82.7
08	1.0	1.82	364	243	182	146	121	104	91.0	80.9	72.8	58.2	48.5	41.6
	1.5	2.23	446	297	223	178	149	127	112	99.1	89.2	71.4	59.5	51.0
	2.0	2.58	516	344	258	206	172	147	129	115	103	82.6	68.8	59.0
	3.0	3.16	632	421	316	253	211	181	158	140	126	101	84.3	72.2
	4.0	3.65	730	487	365	292	243	209	183	162	146	117	97.3	83.4
	5.0	4.08	816	544	408	326	272	233	204	181	163	131	109	93.3
	6.0	4.47	894	596	447	358	298	255	224	199	179	143	119	102
	7.0	4.83	966	644	483	386	322	276	242	215	193	155	129	110
10	1.0	2.28	456	304	228	182	152	130	114	101	91.2	73.0	60.8	52.1
	1.5	2.79	558	372	279	223	186	159	140	124	112	89.3	74.4	63.8
	2.0	3.23	646	431	323	258	215	185	162	144	129	103	86.1	73.8
	3.0	3.95	790	527	395	316	263	226	198	176	158	126	105	90.3
	4.0	4.56	912	608	456	365	304	261	228	203	182	146	122	104
	5.0	5.10	1020	680	510	408	340	291	255	227	204	163	136	117
	6.0	5.59	1118	745	559	447	373	319	280	248	224	179	149	128
	7.0	6.03	1206	804	603	482	402	345	302	268	241	193	161	138
12	1.0	2.73	546	364	273	218	182	156	137	121	109	87.4	72.8	62.4
	1.5	3.34	668	445	334	267	223	191	167	148	134	107	89.1	76.3
	2.0	3.86	772	515	386	309	257	221	193	172	154	124	103	88.2
	3.0	4.73	946	631	473	378	315	270	237	210	189	151	126	108
	4.0	5.46	1092	728	546	437	364	312	273	243	218	175	146	125
	5.0	6.11	1222	815	611	489	407	349	306	272	244	196	163	140
	6.0	6.69	1338	892	669	535	446	382	335	297	268	214	178	153
	7.0	7.23	1446	964	723	578	482	413	362	321	289	231	193	165
15	1.0	3.42	684	456	342	274	228	195	171	152	137	109	91.2	78.2
	1.5	4.19	838	559	419	335	279	239	210	186	168	134	112	95.8
	2.0	4.83	966	644	483	386	322	276	242	215	193	155	129	110
	3.0	5.92	1184	789	592	474	395	338	296	263	237	189	158	135
	4.0	6.84	1368	912	684	547	456	391	342	304	274	219	182	156
	5.0	7.64	1528	1019	764	611	509	437	382	340	306	244	204	175
	6.0	8.37	1674	1116	837	670	558	478	419	372	335	268	223	191
	7.0	9.04	1808	1205	904	723	603	517	452	402	362	289	241	207
20	1.0	4.56	912	608	456	365	304	261	228	203	182	146	122	104
	1.5	5.58	1116	744	558	446	372	319	279	248	223	179	149	128
	2.0	6.44	1288	859	644	515	429	368	322	286	258	206	172	147
	3.0	7.89	1578	1052	789	631	526	451	395	351	316	252	210	180
	4.0	9.11	1822	1215	911	729	607	521	456	405	364	292	243	208
	5.0	10.19	2038	1359	1019	815	679	582	510	453	408	326	272	233
	6.0	11.16	2232	1488	1116	893	744	638	558	496	446	357	298	255
	7.0	12.05	2410	1607	1205	964	803	689	603	536	482	386	321	275

Note: Always double check your application rates. Tabulations are based on spraying water at 21°C.

WATER SENSITIVE PAPER

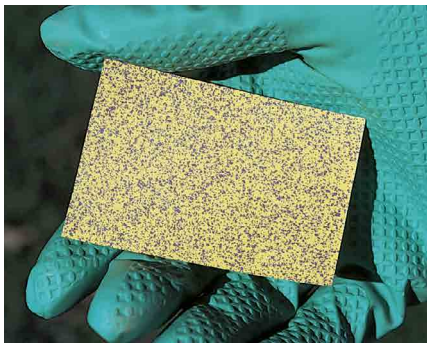
These specially coated papers are used for evaluating spray distributions, swath widths, droplet densities and penetration of spray. Water sensitive paper is yellow and is stained blue by exposure to aqueous spray droplets. For more information on water sensitive paper see Data Sheet 20301.

Water sensitive paper sold by TeeJet Technologies is manufactured by Syngenta Crop Protection AG.

PART NUMBER	PAPER SIZE (mm)	QTY/PKG
20301-1N	76 x 26	50 Cards
20301-2N	76 x 52	50 Cards
20301-3N	500 x 26	25 Strips

HOW TO ORDER

2 0 3 0 1 - 1 N



TEEJET TIP CLEANING BRUSH

HOW TO ORDER

C P 2 0 0 1 6 - N Y

TEEJET CALIBRATION CONTAINER

The TeeJet Calibration Container features a 2.0 L capacity and a raised dual scale in both U.S. and metric graduations. The container is molded of polypropylene for excellent chemical resistance and durability.

HOW TO ORDER

C P 2 4 0 3 4 A - P P

USEFUL FORMULAS

$$\text{l/min (per nozzle)} = \frac{\text{l/ha x km/h x W}}{60{,}000}$$

$$\text{l/ha} = \frac{60{,}000 \text{ x l/min (per nozzle)}}{\text{km/h x W}}$$

l/min – Liters Per Minute
l/ha – Liters Per Hectare
km/h – Kilometers Per Hour
W – Nozzle spacing (in cm) for broadcast spraying
– Spray width (in cm) for single nozzle, band spraying or boomless spraying
– Row spacing (in cm) divided by the number of nozzles per row for directed spraying

USEFUL FORMULAS FOR ROADWAY APPLICATIONS

$$\text{l/km} = \frac{60 \text{ x l/min}}{\text{km/h}} \qquad \text{l/min} = \frac{\text{l/km x km/h}}{60}$$

l/km = Liters Per Lane Kilometer

Note: l/km is not a normal volume per unit area measurement. It is a volume per distance measurement. Increases or decreases in lane width (swath width) are not accommodated by these formulas.

MEASURING TRAVEL SPEED

Measure a test course in the area to be sprayed or in an area with similar surface conditions. Minimum lengths of 30 and 60 meters are recommended for measuring speeds up to 8 and 14 km/h, respectively. Determine the time required to travel the test course. To help ensure accuracy, conduct the speed check with a partially loaded (about half full) sprayer and select the engine throttle setting and gear that will be used when spraying. Repeat the above process and average the times that were measured. Use the following equation or the table at right to determine ground speed.

$$\text{Speed (km/h)} = \frac{\text{Distance (m) x 3.6}}{\text{Time (seconds)}}$$

SPEEDS

SPEED IN km/h	TIME REQUIRED IN SECONDS TO TRAVEL A DISTANCE OF:			
	30 m	60 m	90 m	120 m
5	22	43	65	86
6	18	36	54	81
7	15	31	46	62
8	14	27	41	64
9	—	24	36	48
10	—	22	32	43
11	—	20	29	39
12	—	18	27	36
13	—	17	25	33
14	—	15	23	31
16	—	14	20	27
18	—	—	18	24
20	—	—	16	22
25	—	—	13	17
30	—	—	—	14
35	—	—	—	12
40	—	—	—	11

NOZZLE SPACING

If the nozzle spacing on your boom is different than those tabulated, multiply the tabulated l/ha coverages by one of the following factors. Different application rate charts for different spacing can be found on pages 179–182.

50 cm SPACING	
OTHER SPACING (cm)	CONVERSION FACTOR
20	2.5
25	2
30	1.67
35	1.43
40	1.25
45	1.11
60	.83
70	.71
75	.66

75 cm SPACING	
OTHER SPACING (cm)	CONVERSION FACTOR
40	1.88
45	1.67
50	1.5
60	1.25
70	1.07
80	.94
90	.83
110	.68
120	.63

100 cm SPACING	
OTHER SPACING (cm)	CONVERSION FACTOR
70	1.43
75	1.33
80	1.25
85	1.18
90	1.11
95	1.05
105	.95
110	.91
120	.83

MISCELLANEOUS CONVERSION FACTORS

1 Hectare	=	10,000 Square Meter = 2.471 Acres
1 Acre	=	0.405 Hectare
1 Liter per Hectare	=	0.1069 Gallon per Acre
One Kilometer	=	1,000 Meters = 3,300 Feet = 0.621 Mile
1 Liter	=	0.26 Gallon = 0.22 Imperial Gallon
1 Bar	=	100 Kilopascals = 14.5 Pounds per Square Inch
1 Kilometer per Hour	=	0.62 Mile per Hour

SUGGESTED MINIMUM SPRAY HEIGHTS

The nozzle height suggestions in the table below are based on the minimum overlap required to obtain uniform distribution. However, in many cases, typical height adjustments are based on a 1:1 nozzle spacing to height ratio. For example, 110° flat spray tips spaced 50 cm apart are commonly set 50 cm above the target.

TIP MODEL	ANGLE	HEIGHT (cm)		
		50 cm SPACING	75 cm SPACING	100 cm SPACING
TP, TJ	65°	75	100	NR*
TP, XR, TX, DG, TJ, AI, XRC	80°	60	80	NR*
TP, XR, DG, TT, TTI, TJ, DGTJ, AI, AIXR, AIC, XRC, TTJ, AITTJ, TTI60, APTJ	110°	40	60	NR*
FullJet®	120°	40**	60**	75**
FloodJet® TK, TF, K, QCK, QCTF, 1/4TTJ	120°	40***	60***	75***

* Not recommended.
** Nozzle height based on 30°–45° angle of orientation.
*** Wide angle spray tip height is influenced by nozzle orientation. The critical factor is to achieve a double spray pattern overlap.

SPRAYING LIQUIDS WITH A DENSITY OTHER THAN WATER

Since all the tabulations in this catalog are based on spraying water, which weighs 1 kg per USA gallon, conversion factors must be used when spraying liquids that are heavier or lighter than water. To determine the proper size nozzle for the liquid to be sprayed, first multiply the desired l/min or l/ha of liquid by the water rate conversion factor. then use the new converted l/min or l/ha rate to select the proper size nozzle.

Example:

Desired application rate is 100 l/ha of a liquid that has a density of 1.28 kg/L. Determine the correct nozzle size as follows:

l/ha (liquid other than water) x Conversion factor = l/ha (from table in catalog)

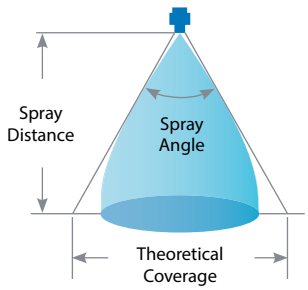
100 l/ha (1.28 kg/L solution) x 1.13 = 113 l/ha (water)

The applicator should choose a nozzle size that will supply 113 l/ha of water at the desired pressure.

SPECIFIC GRAVITY	CONVERSION FACTOR
0.84	0.92
0.96	0.98
1.00–Water	1.00
1.08	1.04
1.20	1.10
1.28–28% Nitrogen	1.13
1.32	1.15
1.44	1.20
1.68	1.30

SPRAY COVERAGE INFORMATION

This table lists the theoretical coverage of spray patterns as calculated from the included spray angle of the spray and the distance from the nozzle orifice. These values are based on the assumption that the spray angle remains the same throughout the entire spray distance. In actual practice, the tabulated spray angle does not hold for long spray distances.

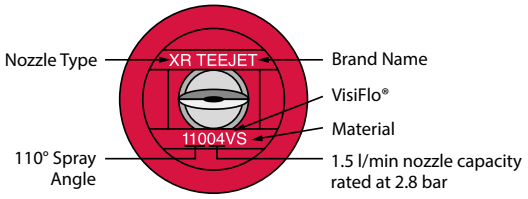


INCLUDED SPRAY ANGLE	THEORETICAL COVERAGE AT VARIOUS SPRAY HEIGHTS							
	20 cm	30 cm	40 cm	50 cm	60 cm	70 cm	80 cm	90 cm
15°	5.3	7.9	10.5	13.2	15.8	18.4	21.1	23.7
20°	7.1	10.6	14.1	17.6	21.2	24.7	28.2	31.7
25°	8.9	13.3	17.7	22.2	26.6	31.0	35.5	39.9
30°	10.7	16.1	21.4	26.8	32.2	37.5	42.9	48.2
35°	12.6	18.9	25.2	31.5	37.8	44.1	50.5	56.8
40°	14.6	21.8	29.1	36.4	43.7	51.0	58.2	65.5
45°	16.6	24.9	33.1	41.4	49.7	58.0	66.3	74.6
50°	18.7	28.0	37.3	46.6	56.0	65.3	74.6	83.9
55°	20.8	31.2	41.7	52.1	62.5	72.9	83.3	93.7
60°	23.1	34.6	46.2	57.7	69.3	80.8	92.4	104
65°	25.5	38.2	51.0	63.7	76.5	89.2	102	115
73°	29.6	44.4	59.2	74.0	88.8	104	118	133
80°	33.6	50.4	67.1	83.9	101	118	134	151
85°	36.7	55.0	73.3	91.6	110	128	147	165
90°	40.0	60.0	80.0	100	120	140	160	180
95°	43.7	65.5	87.3	109	131	153	175	196
100°	47.7	71.5	95.3	119	143	167	191	215
110°	57.1	85.7	114	143	171	200	229	257
120°	69.3	104	139	173	208	243	—	—
130°	85.8	129	172	215	257	—	—	—
140°	110	165	220	275	—	—	—	—
150°	149	224	275	—	—	—	—	—

NOZZLE NOMENCLATURE

There are many types of nozzles available, with each providing different flow rates, spray angles, droplet sizes and patterns. Some of these spray tip characteristics are indicated by the tip number.

Remember, when replacing tips, be sure to purchase the same tip type, angle, and capacity, thereby ensuring your sprayer remains properly calibrated.



INFORMATION ABOUT SPRAY PRESSURE

FLOW RATE

Nozzle flow rate varies with spraying pressure. In general, the relationship between l/min and pressure is as follows:

$$\frac{l/min_1}{l/min_2} = \frac{\sqrt{bar_1}}{\sqrt{bar_2}}$$

This equation is explained by the illustration to the right. Simply stated, in order to double the flow through a nozzle, the pressure must be increased four times.

Higher pressure not only increases the flow rate through a nozzle, but it also influences the droplet size, spray angle, and the rate of orifice wear. As pressure is increased, the droplet size decreases and the rate of orifice wear increases.

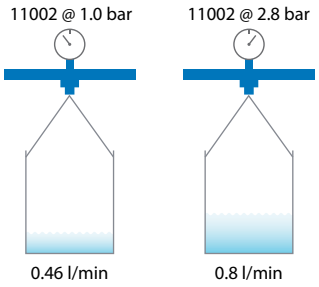
The values given in the tabulation sections of this catalog indicate the most commonly used pressure ranges for the associated spray tips. When information on the performance of spray tips outside of the pressure range given in this catalog is required, contact TeeJet Technologies or your local rep.

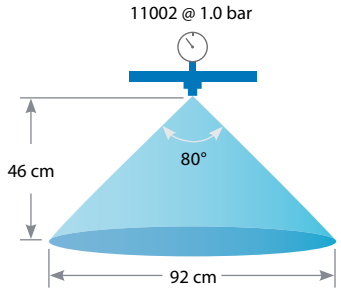
SPRAY ANGLE & COVERAGE

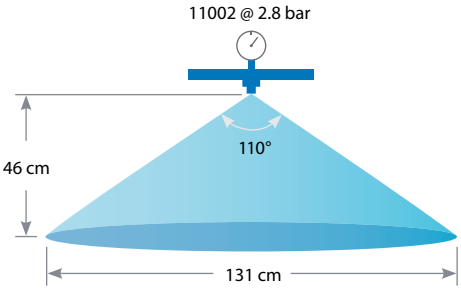
Depending on the nozzle type and size, the operating pressure can have a significant effect on spray angle and quality of spray distribution. As shown here for an 11002 flat spray tip, lowering the pressure results in a smaller spray angle and a significant reduction in spray coverage.

Tabulations for spray tips in this catalog are based on spraying water. Generally, liquids more viscous than water produce relatively smaller spray angles, while liquids with surface tensions lower than water will produce wider spray angles. In situations where the uniformity of spray distribution is important, be careful to operate your spray tips within the proper pressure range.

Note: Suggested minimum spray heights for broadcast spraying are based upon nozzles spraying water at the rated spray angle.







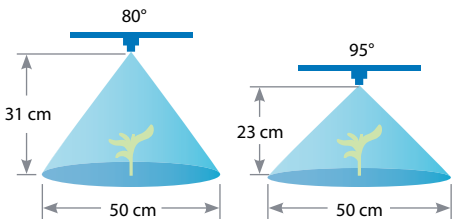
PRESSURE DROP THROUGH VARIOUS HOSE SIZES

FLOW IN l/min	PRESSURE DROP IN bar (3 m LENGTH WITHOUT COUPLINGS)									
	6.4 mm		9.5 mm		12.7 mm		19.0 mm		25.4 mm	
	bar	kPa	bar	kPa	bar	kPa	bar	kPa	bar	kPa
1.9	0.1	9.6		1.4						
3.8				4.8						
5.8			0.1	9.6		2.8				
7.7			0.2	16.5		4.1				
9.6			0.2	23.4	0.1	6.2				
11.5					0.1	8.3				
15.4					0.1	13.8				
19.2					0.2	20.0		2.8		
23.1					0.3	27.6		4.1		
30.8							0.1	6.2		2.1
38.5							0.1	9.6		2.8

HELPFUL REMINDERS FOR BAND SPRAYING

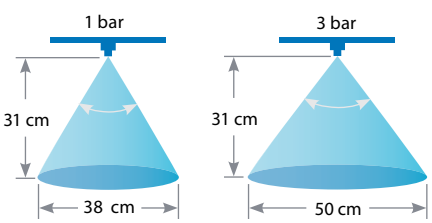
Wider angle spray tips allow the spray height to be lowered to minimize drift.

Example: Even Flat Spray



The spray angle of the nozzle and the resulting band width are directly influenced by the spraying pressure.

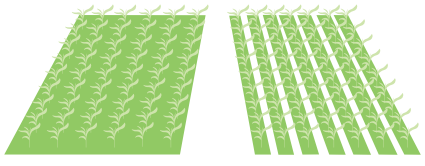
Example: 8002E Even Flat Spray



Use Care When Calculating:
Field Acres/Hectares vs. Treated Acres/Hectares

Field Acres/Hectares = Total Acres/Hectares of Planted Cropland

Treated Acres/Hectares = Field Acres/Hectares x $\frac{\text{Band Width}}{\text{Row Spacing}}$



PRESSURE DROP THROUGH SPRAYER COMPONENTS

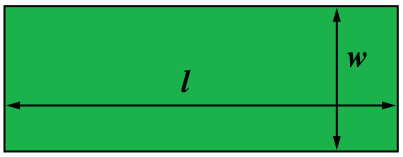
COMPONENT NUMBER	TYPICAL PRESSURE DROP (bar) AT VARIOUS FLOW RATES (l/min)																					
	2.0 l/min	3.0 l/min	4.0 l/min	5.0 l/min	7.5 l/min	10 l/min	15 l/min	20 l/min	25 l/min	30 l/min	40 l/min	50 l/min	75 l/min	100 l/min	150 l/min	200 l/min	250 l/min	300 l/min	375 l/min	450 l/min	550 l/min	750 l/min
AA2 GunJet			0.02	0.03	0.06	0.11	0.26	0.45	0.71	1.02	1.82	2.84										
AA18 GunJet		0.02	0.04	0.07	0.16	0.28	0.62	1.10	1.72	2.48	4.42											
AA30L GunJet		0.03	0.05	0.07	0.17	0.30	0.67	1.19	1.86	2.67	4.75											
AA43 GunJet						0.02	0.05	0.08	0.13	0.18	0.32	0.51	1.14	2.02	4.55							
AA143 GunJet						0.02	0.04	0.07	0.10	0.15	0.27	0.42	0.94	1.68	3.78							
AA6B Valve						0.02	0.03	0.06	0.10	0.14	0.25	0.38	0.87	1.54	3.46							
AA17 Valve						0.02	0.03	0.06	0.10	0.14	0.25	0.38	0.87	1.54	3.46							
AA144A/144P Valve						0.02	0.03	0.06	0.10	0.14	0.25	0.38	0.87	1.54	3.46							
AA144A-1-3/AA144P-1-3 Valve					0.02	0.04	0.09	0.15	0.24	0.34	0.60	0.94	2.13	3.78								
AA145H Valve							0.02	0.04	0.07	0.09	0.17	0.26	0.59	1.05	2.35	4.19						
344 2-way Valve										0.02	0.04	0.06	0.13	0.23	0.52	0.93	1.45	2.09	3.27			
344 3-way Valve								0.02	0.03	0.04	0.07	0.10	0.23	0.41	0.92	1.64	2.57	3.70				
346 2-way Valve														0.02	0.05	0.09	0.15	0.21	0.33	0.48	0.72	1.33
346 3-way Valve													0.03	0.06	0.13	0.23	0.36	0.52	0.82	1.18	1.76	3.27
356 Valve														0.02	0.05	0.09	0.15	0.21	0.33	0.48	0.72	1.33
430 2-way* Manifold						0.02	0.04	0.07	0.11	0.16	0.28	0.44	0.99	1.76	3.95							
430 3-way* Manifold						0.02	0.04	0.07	0.11	0.16	0.28	0.44	0.99	1.76	3.95							
430 FB* Manifold					0.02	0.03	0.06	0.11	0.17	0.25	0.44	0.69	1.56	2.78								
440* Manifold									0.02	0.03	0.06	0.09	0.20	0.35	0.80	1.42	2.21	3.19				
450* Manifold										0.02	0.04	0.06	0.13	0.23	0.52	0.93	1.45	2.09	3.27			
450 FB* Manifold										0.02	0.04	0.06	0.13	0.23	0.52	0.93	1.45	2.09	3.27			
460 2-way* Manifold								0.02	0.02	0.03	0.06	0.09	0.21	0.38	0.85	1.51	2.35	3.39				
460 3-way* Manifold								0.02	0.02	0.03	0.06	0.09	0.21	0.38	0.85	1.51	2.35	3.39				
460 FB* Manifold								0.02	0.03	0.04	0.07	0.10	0.23	0.41	0.92	1.64	2.57	3.70				
490* Manifold														0.02	0.05	0.09	0.15	0.21	0.33	0.48	0.72	1.33
530A 2-Way Manual & Electric Manifold*					0.01	0.02	0.04	0.07	0.11	0.16	0.29	0.45	1.01	1.80	4.04							
530A 3-Way Manual & Electric Manifold*				0.01	0.02	0.04	0.09	0.15	0.24	0.34	0.60	0.94	2.13	3.78								
530A FB Electric Manifold*				0.01	0.03	0.05	0.11	0.19	0.30	0.44	0.77	1.21	2.72	4.84								
540* Manifold																						
QJ300 Nozzle Body		0.02	0.03	0.05	0.11	0.20	0.44	0.78	1.22	1.76	3.12											
QJ360C Nozzle Body	0.02	0.04	0.08	0.12	0.26	0.47	1.06	1.88	2.94													
QJ360E Nozzle Body	0.04	0.09	0.17	0.26	0.59	1.05	2.35															
QJ360F Nozzle Body		0.02	0.03	0.05	0.11	0.20	0.46	0.82	1.28	1.84	3.27											
QJ373	0.01	0.03	0.06	0.09	0.20	0.35	0.80	1.42	2.21	3.19												
QJ375	0.02	0.04	0.07	0.10	0.23	0.41	0.92	1.64	2.57	3.70												
QJ380 Nozzle Body		0.02	0.04	0.07	0.15	0.26	0.59	1.05	1.64	2.35	4.19											
QJ380F Nozzle Body			0.02	0.03	0.07	0.12	0.26	0.47	0.74	1.06	1.88	2.94										
24230A/24216A Nozzle Body	0.04	0.08	0.15	0.23	0.51	0.91	2.06	3.65														
QJ17560A Nozzle Body	0.02	0.04	0.08	0.12	0.26	0.47	1.06	1.88	2.94													
AA122-1/2 Line Strainer						0.02	0.04	0.07	0.10	0.15	0.27	0.42	0.94	1.68	3.78							
AA122-3/4 Line Strainer							0.02	0.04	0.06	0.09	0.15	0.24	0.53	0.94	2.13	3.78						
AA122-QC Line Strainer							0.02	0.03	0.05	0.07	0.12	0.18	0.41	0.74	1.65	2.94						
AA126-3 Line Strainer								0.02	0.03	0.04	0.07	0.11	0.25	0.45	1.01	1.80	2.81	4.04				
AA126-4/F50/M50 Line Strainer										0.02	0.03	0.05	0.11	0.20	0.44	0.78	1.22	1.76	2.74	3.95		
AA126-5 Line Strainer												0.02	0.04	0.07	0.15	0.27	0.43	0.62	0.96	1.38	2.07	3.85
AA126-6/F75 Line Strainer													0.02	0.04	0.09	0.16	0.25	0.36	0.56	0.81	1.21	2.26

*Manifold pressure drop data based on a single valve. Quantity of valves, inlet fitting size and inlet feed setup may affect pressure drop rating. Please contact your local TeeJet sale representative for additional information.

AREA MEASUREMENT

It is essential to know the amount of area that you intend to cover when applying a pesticide or fertilizer. Turf areas such as home lawns and golf course greens, tees and fairways should be measured in square feet or acres, depending upon the units needed.

RECTANGULAR AREAS



Area = Length (*l*) x Width (*w*)

EXAMPLE

What is the area of a lawn that is 150 meters long and 75 meters wide?

Area = 150 meters x 75 meters = 11,250 square meters

By using the following equation, it is possible to determine the area in hectares.

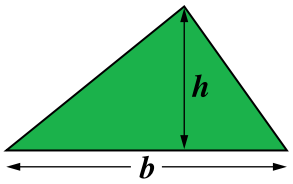
$$\text{Area in hectares} = \frac{\text{Area in square meters}}{\text{10,000 square meters per hectare}}$$

(There are 10,000 square meters in a hectare.)

EXAMPLE

$$\text{Area in hectares} = \frac{\text{11,250 square meters}}{\text{10,000 square meters per hectare}} = \text{1.125 hectares}$$

TRIANGULAR AREAS



$$\text{Area} = \frac{\text{Base } (b) \text{ x Height } (h)}{2}$$

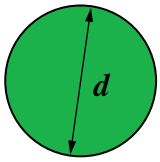
EXAMPLE

The base of a corner lot is 120 meters while the height is 50 meters. What is the area of the lot?

$$\text{Area} = \frac{\text{120 meters x 50 meters}}{2} = \text{3,000 square meters}$$

$$\text{Area in hectares} = \frac{\text{3,000 square meters}}{\text{10,000 square meters per hectare}} = \text{0.30 hectare}$$

CIRCULAR AREAS



$$\text{Area} = \frac{\pi \text{ x Diameter}^2 (d)}{4}$$

$$\pi = 3.14159$$

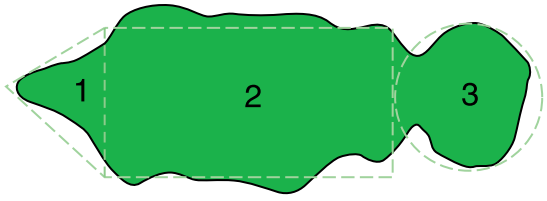
EXAMPLE

What is the area of a green that has a diameter of 15 meters?

$$\text{Area} = \frac{\pi \text{ x (15 meters)}^2}{4} = \frac{3.14 \text{ x } 225}{4} = 177 \text{ square meters}$$

$$\text{Area in hectares} = \frac{\text{177 square meters}}{\text{10,000 square meters per hectare}} = \text{0.018 hectare}$$

IRREGULAR AREAS



Any irregularly shaped turf area can usually be reduced to one or more geometric figures. The area of each figure is calculated and the areas are then added together to obtain the total area.

EXAMPLE

What is the total area of the Par-3 hole illustrated above?

The area can be broken into a triangle (area 1), a rectangle (area 2) and a circle (area 3). Then use the previously mentioned equations for determining areas to find the total area.

$$\text{Area 1} = \frac{\text{15 meters x 20 meters}}{2} = \text{150 square meters}$$

$$\text{Area 2} = \text{15 meters x 150 meters} = \text{2,250 square meters}$$

$$\text{Area 3} = \frac{\text{3.14 x (20)}^2}{4} = \text{314 square meters}$$

$$\text{Total Area} = \text{150 + 2,250 + 314} = \text{2,714 square meters}$$

$$= \frac{\text{2,714 square meters}}{\text{10,000 square meters per hectare}} = \text{0.27 hectare}$$

BROADCAST APPLICATION

Sprayer calibration (1) readies your sprayer for operation and (2) diagnoses tip wear. This will give you optimum performance of your TeeJet tips.

Equipment Needed:

- TeeJet Calibration Container
- Calculator
- TeeJet Cleaning Brush
- One new TeeJet Spray Tip matched to the tips on your sprayer
- Stopwatch or wristwatch with second hand

STEP NUMBER 1

Check Your Tractor/Sprayer Speed!

Knowing your real sprayer speed is an essential part of accurate spraying. Speedometer readings and some electronic measurement devices can be inaccurate because of wheel slippage. Check the time required to move over a 30- or 60-meter strip on your field. Fence posts can serve as permanent markers. The starting post should be far enough away to permit your tractor/sprayer to reach desired spraying speed. Hold that speed as you travel between the "start" and "end" markers. Most accurate measurement will be obtained with the spray tank half full. Refer to the table on page 184 to calculate your real speed. When the correct throttle and gear settings are identified, mark your tachometer or speedometer to help you control this vital part of accurate chemical application.

STEP NUMBER 2

$A=\frac{B+C}{D}$ The Inputs

Before spraying, record the following:	**EXAMPLE:**
Spray tip type on your sprayer (All tips must be identical)	TT11004 Flat Spray Tip
Recommended application volume. (From manufacturer's label)	190 l/ha
Measured sprayer speed	10 km/h
Tip spacing	50 cm

STEP NUMBER 3

Calculating Required Nozzle Output

Determine l/min tip output from formula.

FORMULA: $\text{l/min} = \frac{\text{l/ha x km/h x w}}{60{,}000}$

EXAMPLE: $\text{l/min} = \frac{190 \times 10 \times 50}{60{,}000}$

ANSWER: 1.58 l/min

STEP NUMBER 4

Setting the Correct Pressure

Turn on your sprayer and check for leaks or blockage. Inspect and clean, if necessary, all tips and strainers with TeeJet brush. Replace one tip and strainer with an identical new tip and strainer on sprayer boom.

Check appropriate tip selection table and determine the pressure required to deliver the tip output calculated from the formula in Step 3 for your new tip. Since all of the tabulations are based on spraying water, conversion factors must be used when spraying solutions that are heavier or lighter than water (see page 185).

EXAMPLE: (Using above inputs) refer to TeeJet table on page 17 for TT11004 flat spray tip. The table shows that this spray tip delivers 1.58 l/min at 3 bar.

Turn on your sprayer and adjust pressure. Collect and measure the volume of the spray from the new tip for one minute in the collection jar. Fine tune the pressure until you collect 1.58 l/min.

You have now adjusted your sprayer to the proper pressure. It will properly deliver the application rate specified by the chemical manufacturer at your measured sprayer speed.

STEP NUMBER 5

Checking Your System

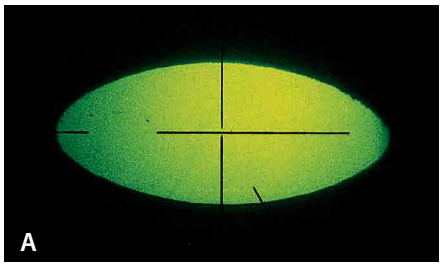
PROBLEM DIAGNOSIS: Now, check the flow rate of a few tips on each boom section. If the flow rate of any tip is 10% greater or less than that of the newly installed spray tip, recheck the output of that tip. If only one tip is faulty, replace with new tip and strainer and your system is ready for spraying. However, if a second tip is defective, replace all tips on the entire boom. This may sound unrealistic, but two worn tips on a boom are ample indication of tip wear problems. Replacing only a couple of worn tips invites potentially serious application problems.

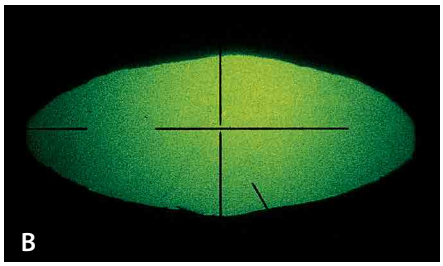
Banding and Directed Applications

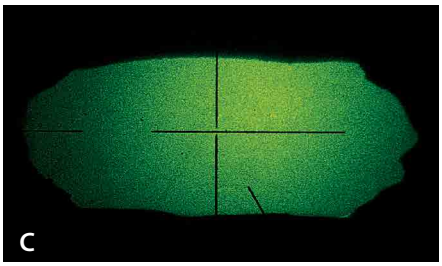
The only difference between the above procedure and calibrating for banding or directed applications is the input value used for "W" in the formula in Step 3.

For single tip banding or boomless applications:
W = Sprayed band width or swath width (in cm).

For multiple nozzle directed applications:
W = Row spacing (in cm) divided by the number of tips per row.







TIPS DON'T LAST FOREVER!

There is sufficient evidence that spray tips may be the most neglected component in today's farming. Even in countries with obligatory sprayer testing, spray tips are the most significant failure. On the other hand, they are among the most critical of items in proper application of valuable agricultural chemicals.

Using slightly worn tips is very costly. Water, pesticides, and labor are wasted and pesticide application quality can be compromised.

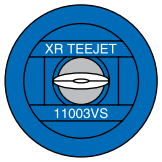
AN INSIDE LOOK AT NOZZLE ORIFICE WEAR AND DAMAGE

While wear may not be detected when visually inspecting a tip, it can be seen when viewed through an optical comparator. The edges of the worn tip (B) appear more rounded than the edges of the new tip (A). Damage to tip (C) was caused by improper cleaning. The spraying results from these tips can be seen in the illustrations below.

DETERMINING TIP WEAR

The best way to determine if a spray tip is excessively worn is to compare the flow rate from the used tip to the flow rate of a new tip of the same size and type. Charts in this catalog indicate the flow rates for new tips. Check the flow of each tip by using an accurate graduated collection container, a timing device and an accurate pressure gauge mounted at the nozzle body tip. Compare the flow rate of the old tip to that of the new one. Spray tips are considered excessively worn and should be replaced when their flow exceeds the flow of a new tip by 10%. Reference page 189 for more information.

SPRAY TIP CARE IS THE FIRST STEP TO SUCCESSFUL APPLICATION

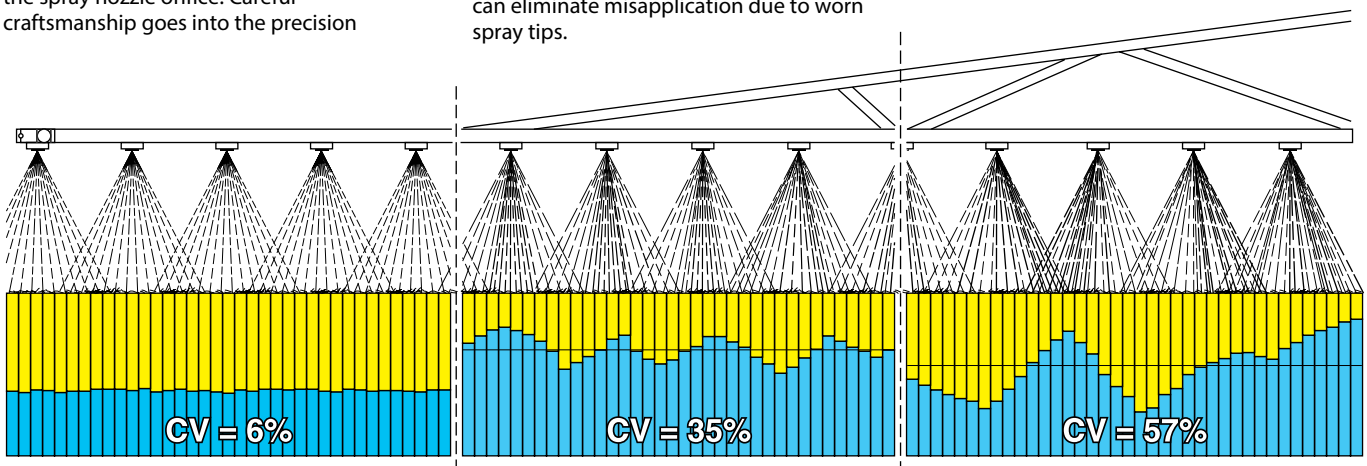


The successful performance of a crop protection product is highly dependent on its proper application as recommended by the product manufacturer. Proper selection and operation of spray nozzles are very important steps in accurate product application. The volume of spray passing through each nozzle plus the droplet size and spray distribution on the target can influence pest control.

Critical in controlling these three factors is the spray nozzle orifice. Careful craftsmanship goes into the precision manufacturing of each nozzle orifice. ISO standards and European standards require very small flow tolerances of new nozzles (+/-5%) of nominal flow. Many TeeJet spray tip types and sizes are already JKI-approved, which confirms the high quality standard designed into TeeJet nozzles. To maintain the quality in practical spraying as long as possible, the operator's job is the proper maintenance of those spray tips.

The illustration below compares the spraying results obtained from well-maintained vs. poorly-maintained spray tips. Poor spray distribution can be prevented. Selection of longer wearing tip materials or frequent replacement of tips from softer materials can eliminate misapplication due to worn spray tips.

Careful cleaning of a clogged spray tip can mean the difference between a clean field and one with weed streaks. Flat spray tips have finely crafted thin edges around the orifice to control the spray. Even the slightest damage from improper cleaning can cause both an increased flow rate and poor spray distribution. Be sure to use adequate strainers in your spray system to minimize clogging. If a tip does clog, only use a soft bristled brush to clean it—never use a metal object. Use extreme care with soft tip materials such as plastic. Experience has shown that even a wooden toothpick can distort the orifice.



NEW SPRAY TIPS
Produce a uniform distribution when properly overlapped.

WORN SPRAY TIPS
Have a higher output with more spray concentrated under each tip.

DAMAGED SPRAY TIPS
Have a very erratic output – overapplying and underapplying.

SPRAY DISTRIBUTION QUALITY

One of the most overlooked factors that can dramatically influence the effectiveness of a given crop production product is spray distribution. The uniformity of the spray distribution across the boom or within the spray swath is an essential component of achieving maximum product effectiveness with minimal cost and minimal non-target contamination. It is critical that carrier and product rates are applied at the recommended minimum rate. There are many other factors influencing a crop production product's effectiveness, such as weather, application timing, active ingredient rates, pest infestation, etc. However, an operator must become aware of spray distribution quality if maximum efficiency is expected.

MEASUREMENT TECHNIQUES

Spray distribution can be measured in different ways. TeeJet Technologies and some sprayer manufacturers, as well as other research and testing stations, have patternators (spray tables) that collect the spray from tips on a standardized or real boom. These patternators have several channels aligned perpendicular to the spray tip, according to the standard ISO 5682-1.

The channels carry the spray liquid into vessels for measuring and analysis (see photo with TeeJet patternator). Under controlled conditions, very accurate distribution measurements can be made for tip evaluation and development. Distribution measurements can also take place on an actual farm sprayer. For static measurements along with the sprayer boom, a patternator equal or very similar to the one described earlier is placed under the boom in a stationary position or as a small patternator unit scanning the whole boom up to a width of 50 m. Any system of patternator measures electronically the quantity of water in each channel and calculates the values. A distribution quality test gives the applicator important information about the state of the tips on the boom. When much more detailed information about spray quality and coverage is required, a dynamic system—spraying a tracer (dye)—can be used. The same is true if the distribution within the swath on a boom must be measured.

Most of the distribution measuring devices result in data points representing the sprayer's boom swath uniformity. These data points can be very revealing just through visual observation. However, for comparison reasons, a statistical method is widely accepted. This method is Coefficient of Variation (CV). The CV compiles all the patternator data points and summarizes them into a simple percentage, indicating the amount of variation within a given distribution. For extremely uniform distributions under accurate conditions, the calculated CV shall not exceed 10%, according to the ISO 16122-2. As some European countries have stricter CV (e.a. JKI requires a CV lower than 7%) and may require the sprayer's distribution to be tested for uniformity after a certain time. These types of stipulations emphasize the great importance of distribution quality and its effect on crop protection products effectiveness.

TeeJet precisely produces spray tips that match up with the most restrictive requirements in these European countries.

FACTORS AFFECTING DISTRIBUTION

There are a number of factors contributing to the distribution quality of a spray boom or resulting CV percentage. During a static measurement, the following factors can significantly affect the distribution.

- Spray Tips
  - type
  - pressure
  - spacing
  - spray angle
  - offset angle
  - spray pattern quality
  - flow rate
  - overlap
- Boom Height
- Worn Tips
- Pressure Losses
- Plugged Strainers
- Plugged Tips
- Plumbing Factors Influencing Liquid Turbulence at the Tip

Additionally, in the field during the spraying application or during a dynamic distribution test, the following can influence the distribution quality:

- Boom Stability
  - vertical movement (pitch)
  - horizontal movement (yaw)
- Environmental Conditions
  - wind velocity
  - wind direction
- Pressure Losses (sprayer plumbing)
- Sprayer Speed and Resulting Turbulence

The effect of distribution uniformity on the efficiency of a crop protection product can vary under different circumstances. The crop protection product itself can have a dramatic influence over its efficiency.

Consult the manufacturer's product label or recommendation before spraying.

DROPLET SIZE & DRIFT INFORMATION

A spray tip pattern is made up of numerous spray droplets of varying sizes. Droplet size refers to the diameter of an individual spray droplet. Droplet sizes are usually measured in microns (micrometers – µm). One micron equals 0.001 mm. The micron is a useful unit of measurement because it is small enough that whole numbers can be used in droplet size measurement.

Since most tips provide a range of droplet sizes (otherwise known as droplet size distribution), it is useful to summarize this with statistical analysis. Advanced droplet size measuring devices are automated, using computers and high-speed illumination sources such as lasers to analyze thousands of droplets in a few seconds. TeeJet Technologies uses the most innovative laser measuring instrumentation to characterize sprays, obtaining droplet size and other important information, such as $DV_{0.1}$, $DV_{0.5}$ (or VMD), $DV_{0.9}$, percentage of driftable fines, and relative span which are used to classify droplet size and the quality of droplets produced by a given spray tip.

Since the smaller droplets have a greater tendency to move off-target, it makes sense to determine what the percentage of small droplets is for a particular spray tip to minimize it when drift is a concern. Droplets below 150 microns are considered potential drift contributors.

The table to the right shows several tips and their percentage of driftable fines.

DRIFTABLE FINES

NOZZLE TYPE (1.89 l/min CAPACITY)	APPROXIMATE PERCENTAGE OF SPRAY VOLUME LESS THAN 150 MICRONS	
	1.5 bar	3 bar
XR – Extended Range TeeJet® (110°)	18%	29%
TTJ60 – Turbo TwinJet® (110°)	8%	14%
TT – Turbo TeeJet® (110°)	7%	16%
TF – Turbo FloodJet®	5%	9%
AIXR – Air Induction XR TeeJet® (110°)	4%	9%
AITTJ60 – Air Induction Turbo TwinJet® (110°)	2%	3%
AI – Air Induction TeeJet® (110°)	5% (@ 2 bar)	7%
TTI60 – Turbo TeeJet® Induction TwinJet® (110°)	2%	4%
TTI – Turbo TeeJet® Induction (110°)	<1%	2%
APTJ – AccuPulse® TwinJet® (110°)	<1%	1%

Data obtained from Oxford VisiSizer system, spraying water at 21°C under laboratory conditions.

Figure 1. This is not what crop protection should look like!

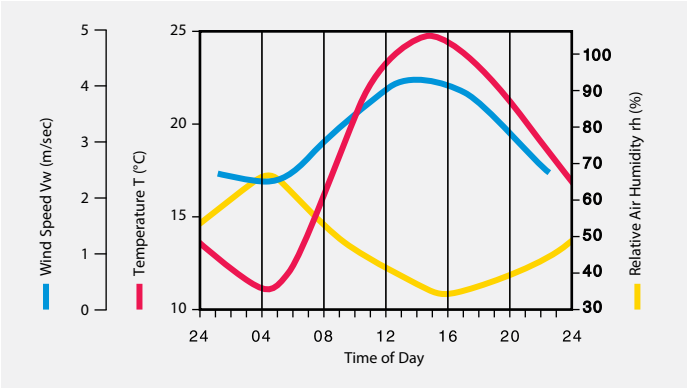


Figure 2.
Development of wind speed, air temperature and relative air humidity (example).
From: Malberg

When applying crop protection products, spray drift is defined as the movement and deposition of spray particles through the air to non-target locations. The two forms of spray drift are particle drift and vapor drift. Particle drift can occur during or after a crop protection product application, which results from droplets physically moving to non-target locations via air currents. It is more related to the application technology choices, such as spray tip selection and sprayer calibration. Vapor drift of the active ingredient occurs right after the crop protection product application and the crop protection product vapor reaches non-target locations. It is dependent on the crop protection product physicochemical characteristics when it has a greater trend to volatilize. Weather conditions, such as low relative humidity and high temperatures directly impact vapor drift.

The smaller the droplet, the greater the drift potential. Droplets most prone to drift are those with a diameter that is less than 150 µm and easily move off the target area by wind or other climatic conditions. Drift can cause crop protection products to be deposited in undesirable areas with serious consequences, such as:

- Damage to sensitive adjoining crops.
- Surface water contamination.
- Health risks for animals and people.
- Possible contamination to the target area and adjacent areas or possible overapplication within the target area.

CAUSES OF SPRAY DRIFT

Several variables contribute to spray drift; these are predominantly due to the spray equipment system and meteorological factors.

- **DROPLET SIZE**

  Within the spray equipment system, droplet size is the most influential factor related to drift.

  When a liquid solution is sprayed under pressure it is atomized into droplets of varying sizes: **The smaller the spray tip size and the greater the spray pressure, the smaller the droplets and therefore the greater the proportion of driftable droplets.**

- **SPRAY HEIGHT**

  As the distance between the spray tip and the target area increases, the greater impact wind speed can have on drift. The influence of wind can increase the proportion of smaller droplets being carried off target and considered drift.

  Do not spray at greater heights than those recommended by the spray tip manufacturer, while taking care not to spray below the minimum recommended heights.

- **OPERATING SPEED**

  Increased operating speeds can cause the spray to be diverted back into upward wind currents and vortexes behind the sprayer, which traps small droplets and can contribute to drift.

  Apply crop protection products according to good, professional practices at maximum operating speeds of 9 to 13 km/h (up to 13 km/h). As wind velocities increase, reduce operating speed. *

  * Liquid fertilizer applications using the TeeJet® tips with very coarse droplets can be performed at higher operating speeds.

- **WIND SPEED**

  Among the meteorological factors affecting drift, wind speed has the greatest impact. Increased wind speeds cause increased spray drift. It is common knowledge that in most parts of the world the wind speed is variable throughout the day (see Figure 2). Therefore, it is important for spraying to take place during the relatively calm hours of the day. The early morning and early evening are usually the calmest. However, wind speed below 5 km/h can be an indicator of air instability, such as temperature inversion, resulting in drift. Ideally, winds should be in the range of 5 to 14 km/h, and crop protection products should not be sprayed when winds exceed 16 km/h. Check the product label for more information.

  Wind measurements should be taken throughout the spraying operation with a wind meter or anemometer. As the risk of spray drift increases, selecting tips designed to produce coarser droplets that are less prone to drift is extremely important, such as spray tips with air induction AIXR, AITTJ60, AI, TTI60, and TTI.

- **AIR TEMPERATURE AND RELATIVE HUMIDITY**

  Air temperature and relative humidity directly influence droplet evaporation. Finer droplets are also more vulnerable to high temperatures and low relative humidity conditions, and when compared to coarser droplets, they are less likely to reach the target.

  High temperature during the spraying application may necessitate system changes, such as tips that produce a coarser droplet or suspending spraying.

- **CROP PROTECTION PRODUCTS AND CARRIER VOLUME**

  Before applying crop protection products, the applicator should read and follow all instructions provided by the manufacturer.

  Since extremely low carrier volume usually necessitates the use of small tip sizes, the drift potential is increased. As high a carrier volume as practical is recommended.

SPRAY TIPS FOR DRIFT REDUCTION

Drift potential can be minimized even when it is necessary to use small tip capacities by selecting tip types that produce larger droplets (bigger Volume Median Diameter (VMD) and a lower percentage of small droplets.

Figure 3 is an example showing VMD's produced by tips of identical flow rates (05 capacity / 1.89 l/min capacity) at the optimum pressure ranges for the individual tips. Within the presented tips, XR produces the smaller droplets followed by TTJ60/TT, AIXR, AITTJ60, AI, TTI60/TTI, and APTJ. TTI, TTI60, and APTJ tips produce the coarsest droplet size spectrum of this group and provide the maximum drift control, producing less than 2% of driftable fines.

Looking at individual spray tips, the greater the operational pressure, the smaller the formed droplet, and the greater the drift potential. Understanding this concept, it is possible to affirm that for all tips is possible to reduce drift at lower pressure and achieve better coverage at higher pressures. However, if just by reducing the operating pressure the droplet size and the percentage of driftable fines are still above the limit for a safe application, the user must select a spray tip that produces coarser droplets.

For example, a self-propelled sprayer operating with a ground speed of 16 km/h, tip spacing of 50 cm, and an application rate of 140 l/ha would need a tip with a capacity of 1.8 l/min, which all tips presented on Figure 3 would be able to apply at 3 bar. However, the VMD increases significantly from the XR to the TTI/TTI60/APTJ, from fine to ultra coarse droplet size. For a contact fungicide application, a TTJ60 would be a good fit while an AIXR or AITTJ60 would be a better fit for an herbicide application. Therefore, for applicators to select the correct spray tip size it is necessary to consider the droplet size and spray pressure at which a crop protection product is most effective according to the label.

With this, they simply must reduce pressure and ground speed to reduce spray drift or even comply with statutory buffer zone requirements.

While the classic XR TeeJet orifice provides two functions; metering the volume flow rate and distributing and creating the droplets, all other spray tip types discussed above use a pre-orifice for metering while droplet creation and distribution take place at the exit orifice (Figure 4). Both functions and devices relate to each other with respect to geometry and spacing and interact with respect to the droplet size produced. The TT, TTJ60, AITTJ60, TTI60, and TTI tips force the liquid to change direction after it has passed the pre-orifice, forcing it into a horizontal chamber and to change direction again into the nearly vertical passage in the orifice itself. The AIXR, AI, AITTJ60, TTI60, and TTI air induction tips operate on the Venturi principle, where the pre-orifice generates a higher-velocity stream, aspirating air through the side holes. This specific air/liquid mix creates more coarse droplets that are filled with air, depending on the crop protection product used.

APTJ is a non-air induction tip, that produced highly drift-resistant droplet due do its patent-pending recirculating design.

SUMMARY

Successful drift management centers on sound knowledge about drift contributing factors and the use of drift control TeeJet spray tips. To strike a sound balance between successful crop protection products application and environmental protection, applicators should use approved broadcast TeeJet spray tips that are classified as drift control and operate these within the pressure ranges that ensure product effectiveness (i.e., set spray tips to 50% drift control or less).

The following list shows all the relevant factors that need to be considered, optimized, or applied to achieve effective drift control:

- Low-Drift TeeJet spray tips
- Spraying pressure and droplet size
- Application rate and tip size
- Spraying height
- Forward speed
- Wind speed
- Ambient temperature and relative humidity
- Buffer zones (or apply options that allow reducing the width of buffer strips)
- Compliance with manufacturer instructions

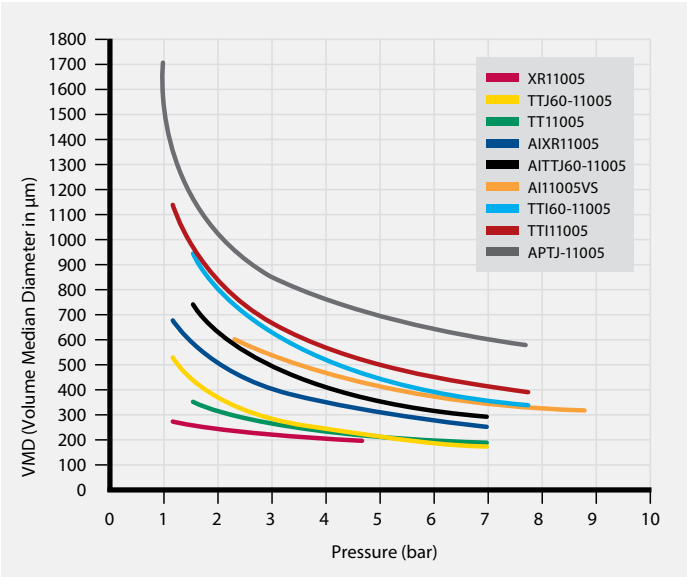


Figure 3. Volumetric droplet diameters of XR, TT, TTJ60, AIXR, AI, AITTJ60, TTI60, TTI, and APTJ spray tips relative to pressure.

Measurement Conditions:
- Continuous Oxford Laser measurement across the full width of the flat spray
- Water temperature 21ºC under laboratory conditions

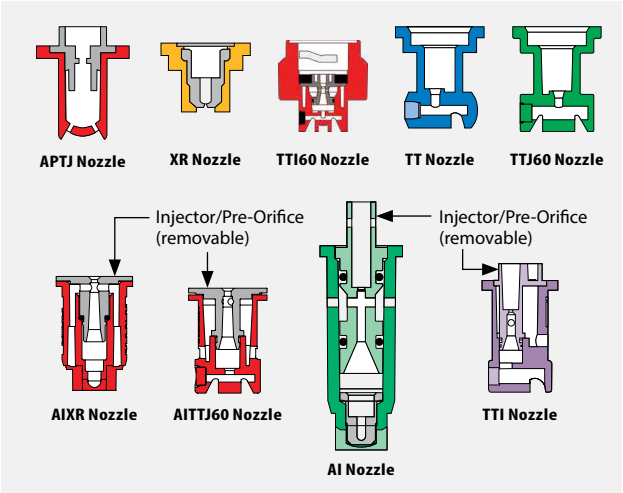


Figure 4. APTJ, XR, TT, TTJ60, AIXR, AITTJ60, AI, TTI60, and TTI spray tips cross-section view.

DRIFT CONTROL ASSESSMENT SYSTEMS IN EUROPE

ASSESSMENT OF NOZZLE DRIFT CONTROL IN EUROPE

In times of hard discussions regarding environmental protection, the drift control of the spray tips and spray systems became a very important topic in most of the European countries and mandatory in the Nord, West, and Middle Europe. Ones with the implementation of the European Green Deal, it's expected that the South and East parts of Europe will align at the same standards.

Drift reduction is not a new topic. Preliminary assessment criteria for drift control during by crop protection products applications were first defined in the 1980's and 1990's. With the XR TeeJet® spray tips and the first generation of drift control spray tips (DG TeeJet®), TeeJet achieved significant advances in crop protection technology at that time. However, stricter rules for buffer zones to protect sensitive areas have led to the development of a program that assesses spray tip drift reduction, as well as innovative spray tip designs (AI TeeJet) producing larger droplet sizes by maintaining perfect coverage.

The testing institutes from Germany, the United Kingdom, France, and the Netherlands have different standardized assessments for measuring drift reduction. The Julius Kühn Institute-Federal Research Institute (JKI) standards and results are accepted by most of the European countries in the national approval process.

The countries mentioned above have compiled corresponding percentage drift control categories, which vary from one to another in some areas. While in Germany and Netherlands drift control is categorized as 50% / 75% / 90% / 95%, in the United Kingdom they are categorized as 2 star**, 3 star ***, and 4 star****, and 66% in France. Furthermore, the same spray tip type and size operated at the same pressure can have a different category of drift reduction in different countries that use different assessments to evaluate drift control.

Drift reduction ratings are currently mandatory in some countries like Germany, Netherlands, France, Belgium, Denmark, and the United Kingdom, while in other countries the drift reduction is only a recommendation to assist farmers in selecting a tip that is more suitable for their applications.

As TeeJet Technologies is present in all European countries, all new spray tips are tested and have them assessed in each of these countries to verify the effectiveness of the technical advances so farmers can use our company products without fearing conflict with the government.

THE SYSTEM IN GERMANY

In Germany, the Julius Kühn Institute-Federal Research Institute for Cultivated Plants (JKI), is responsible for testing nozzles for agricultural use. Drift measurements are taken for standard spray tips (110–120°, symmetric pattern, 50 cm spacing) in the wind tunnel, using vertical collectors and the "DIX model" (Drift Potential Index), which gives values that express the percentage of drift reduction categories. For narrow-angle spray tips, asymmetric or 25 cm spacing, the measurements take place in the field under standardized conditions for temperature, wind direction, wind speed, and forward speed.

THE SYSTEM IN THE UNITED KINGDOM (UK)

The UK agency for the equipment certification is the Local Environmental Risk Assessments for Pesticides (LERAP). Spray application systems that have been tested regarding drift reduction in the SILSOE wind tunnel will get a "LERAP-Low Drift Star Rating" which are: 2 star **, 3 star ***, and 4 star ****, which roughly corresponds to 50%, 75%, and 90% of drift reduction respectively.

In contrast to the JKI, the UK wind tunnel methodology records the droplets landed on horizontal collectors.

THE SYSTEM IN THE NETHERLANDS

The local authority in NL for the spray equipment approvals is the Technical Assessment Committee (TCT), and the results of spray tips that reduce drift by 50%, 75%, 90%, and 95% are published on the DRD list. Instead of using wind tunnel systems as used at JKI and LERAP, the Wageningen University (WUR) uses a Phase Doppler Particle Analyzer (PDPA laser) to investigate droplet velocity and some parameters such as $Dv_{0.1}$, VMD, $Dv_{0.9}$, and volume fraction <100µm. The data collected is then fed into the IDEFICS model.

THE SYSTEM IN FRANCE

In France, the tested spray tips and spray equipment are published on the official list of the Ministry of Agriculture and Food, after consulting the National Research Institute for Agriculture, Food and the Environment (INRAE). Up to now, the drift reduction requirement is 66% for applications that take place close to sensitive areas.

BENEFITS & OPTIONS FOR USERS

The use of low drift spray tips brings significant benefits to users around the world. Depending on the location of the fields from environmentally sensitive areas such as surface water and field boundaries, applicators can reduce the width of buffer zones, as stipulated by the relevant restrictions in association with the approval of the pesticide (e.g. 20-meter no-spray buffer zone) and the national legislation. In general, for successful crop protection, it is only necessary to select spray tips with a high percentage classification for drift control in those situations where statutory buffer zone requirements apply. Otherwise, it is preferable to use nozzles at a spray pressure achieving a 50% drift control or less, depending on the application.

For further information about the low-drift categories of TeeJet spray tips, contact your TeeJet representative or go to www.teejet.com.

DROP SIZE CLASSIFICATION

The droplet size classification follows a strict and concise parameter, which was first created in 1985 in England by the British Crop Protection Council (BCPC). This classification system established a series of droplet size classes.

In 1999, the American Society of Agricultural and Biological Engineers (ASABE) developed a new standard for droplet size classification—ASABE S572, in which the droplet size boundaries were set by a series of defined TeeJet reference spray tips and operating pressures (ASABE, 2009). The ASABE S572 original standard established six droplet size classes (VF, F, M, C, VC, and XC), with 5 reference nozzles establishing the boundaries between them. Two additional droplet size classes were added in the same year on the review of the standard—ASABE S572.1, totaling eight classes (XF, VF, F, M, C, VC, XC, and UC).

The International Organization for Standardization (ISO) worked on the development of an international droplet size classification standard and, in 2018, the ISO 25358 standard was published (ISO, 2018), which carried out the update of some droplets size classification ranges to better distribute the classification boundaries. Only the C/VC, VC/XC, and XC/UC boundaries have changed. The new droplet size data in catalog 52 are based on this new classification standard. The ASABE has updated the standard to match with the ISO 25358 as ASABE S572.3.

Spray tip type selection is often based upon droplet size. The droplet size from a tip becomes very important when the efficacy of a particular crop protection product is dependent on coverage, or the prevention of spray drift is a priority. Most of the spray tips used in agriculture produce droplet sizes in the range of very fine to ultra coarse droplets.

Spray tips that produce droplets in the fine to the medium range are usually recommended for post-emergence contact applications, such as fungicides and insecticides, which require excellent coverage on the intended target area. Spray tips producing medium to very coarse droplets, in general, are more recommended for systemic insecticides and contact herbicides. Spray tips producing droplets from the medium to the ultra coarse provide significantly improved drift control while offering less thorough target coverage. These spray tips are commonly used for soil applied and systemic herbicides.

It is important to remember that a given spray tip produces different droplet sizes when operating at different pressures. For example, an AIXR11003 produces a very coarse droplet size at 2 bar and a medium droplet size at 4 bar.

Care must be taken when comparing the droplet size of different tips, as different droplet size standards can bias the comparison and measuring techniques.

CATEGORY	COLOR CODE
Extremely Fine	XF
Very Fine	VF
Fine	F
Medium	M
Coarse	C
Very Coarse	VC
Extremely Coarse	XC
Ultra Coarse	UC

Droplet size classifications are in accordance with ISO Standard 25358 at the date of printing, and its standard classification is subject to change.

For the latest accurate information about spray tips and their droplet size, please contact your nearest TeeJet representative.

Droplet size classes are shown in the following tables to assist in choosing an appropriate spray tip.

AI TEEJET® (AI EVEN)

TIP PART NO.	bar										
	2	2.5	3	3.5	4	4.5	5	5.5	6	7	8
AI95015E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	M
AI6502E	UC	XC	XC	XC	VC	VC	VC	VC	VC	C	C
AI9502E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	C
AI65025E	UC	XC	XC	XC	XC	VC	VC	VC	VC	VC	C
AI95025E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	C
AI6503E	UC	XC	XC	XC	XC	VC	VC	VC	VC	C	C
AI9503E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	C
AI6504E	UC	XC	XC	XC	VC	VC	VC	VC	C	C	C
AI9504E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	C
AI6505E	UC	XC	XC	XC	XC	VC	VC	VC	VC	VC	VC
AI9505E	XC	XC	XC	VC	VC	VC	VC	VC	C	C	C
AI6506E	UC	UC	XC	XC	XC	XC	XC	VC	VC	VC	VC
AI9506E	UC	XC	XC	XC	VC	VC	VC	VC	VC	C	C
AI9508E	UC	XC	XC	XC	VC	VC	VC	VC	C	C	C

AI3070 TEEJET® (AI3070)

TIP PART NO.	bar									
	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
AI3070-015	VC	VC	VC	C	C	C	C	M	M	M
AI3070-02	XC	VC	VC	C	C	C	C	M	M	M
AI3070-025	XC	VC	VC	VC	C	C	C	C	M	M
AI3070-03	XC	XC	VC	VC	VC	C	C	C	C	C
AI3070-04	XC	XC	VC	VC	VC	VC	C	C	C	C
AI3070-05	UC	XC	XC	VC	VC	VC	VC	C	C	C

AI TEEJET® (AI)

TIP PART NO.	bar								
	2	3	4	5	5.5	6	6.5	7	8
AI80015	XC	VC	VC	VC	C	C	C	C	C
AI110015	XC	VC	VC	C	C	C	C	C	M
AI8002	XC	XC	VC	VC	VC	C	C	C	C
AI11002	XC	VC	VC	C	C	C	C	C	M
AI80025	XC	XC	VC	VC	VC	C	C	C	C
AI110025	XC	VC	VC	C	C	C	C	C	M
AI8003	XC	XC	VC	VC	VC	C	C	C	C
AI11003	XC	VC	VC	C	C	C	C	C	M
AI8004	XC	XC	VC	VC	VC	C	C	C	C
AI11004	XC	VC	VC	C	C	C	C	C	M
AI8005	XC	XC	VC	VC	VC	VC	C	C	C
AI11005	XC	XC	VC	VC	VC	C	C	C	C
AI8006	XC	XC	VC	VC	VC	VC	VC	VC	VC
AI11006	XC	XC	VC	VC	VC	C	C	C	C
AI11008	XC	XC	VC	VC	VC	VC	VC	VC	C

DROP SIZE CLASSIFICATION

AIC TEEJET® (AIC)

TIP PART NO.	bar								
	2	3	4	5	5.5	6	6.5	7	8
AIC110015-VS	XC	XC	VC	VC	C	C	C	C	C
AIC11002-VS	XC	XC	VC	VC	C	C	C	C	C
AIC110025-VS	XC	XC	VC	VC	C	C	C	C	C
AIC11003-VS	XC	XC	VC	VC	C	C	C	C	C
AIC11004-VS	XC	XC	VC	VC	C	C	C	C	C
AIC11005-VS	XC	XC	VC	VC	VC	C	C	C	C
AIC11006-VS	XC	XC	VC	VC	VC	VC	C	C	C
AIC11008-VS	XC	XC	VC	VC	VC	VC	VC	VC	VC
AIC11010-VS	UC	XC	XC	XC	VC	VC	VC	VC	VC
AIC11015-VS	UC	XC	XC	XC	VC	VC	VC	VC	VC

ACCUPULSE® TWINJET® (APTJ)

TIP PART NO.	bar											
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	7
APTJ-110015	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC	XC
APTJ-11002	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-110025	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11003	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11004	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11005	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11006	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11008	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11010	UC	UC	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC
APTJ-11012	UC	UC	UC	UC	UC	UC	XC	XC	XC	XC	XC	XC

AIR INDUCTION TURBO TWINJET® (AITTJ60)

TIP PART NO.	bar									
	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
AITTJ60-11002	XC	VC	VC	VC	C	C	C	C	C	M
AITTJ60-110025	XC	VC	VC	VC	VC	C	C	C	C	C
AITTJ60-11003	XC	XC	VC	VC	VC	C	C	C	C	C
AITTJ60-11004	XC	XC	VC	VC	VC	C	C	C	C	C
AITTJ60-11005	XC	XC	XC	VC	VC	VC	C	C	C	C
AITTJ60-11006	XC	XC	XC	VC	VC	VC	VC	C	C	C
AITTJ60-11008	UC	UC	XC	XC	XC	XC	VC	VC	VC	VC
AITTJ60-11010	UC	UC	XC	XC	XC	XC	VC	VC	VC	VC
AITTJ60-11015	UC	UC	XC	XC	XC	XC	VC	VC	VC	VC

AITX CONEJET® (AITXA & AITXB)

TIP PART NO.	bar															
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
AITX01	XC	VC	VC	VC	C	C	M	M	M	M	M	F	F	F	F	F	F
AITX015	XC	VC	VC	VC	C	C	M	M	M	M	M	F	F	F	F	F	F
AITX02	XC	VC	VC	VC	C	C	C	C	M	M	M	M	M	M	M	M	F
AITX025	XC	XC	XC	VC	VC	VC	VC	C	C	C	M	M	M	M	M	M	F
AITX03	XC	XC	XC	VC	VC	VC	VC	C	C	C	M	M	M	M	M	M	F
AITX04	UC	UC	XC	VC	VC	VC	VC	C	C	C	C	C	M	M	M	M	M

AIUB TEEJET® (AIUB)

TIP PART NO.	bar									
	2	2.5	3	3.5	4	4.5	5	5.5	6	7
AIUB8502	UC	XC	XC	XC	VC	VC	VC	VC	C	C
AIUB85025	UC	XC	XC	VC	VC	VC	VC	C	C	C
AIUB8503	XC	XC	XC	VC	VC	VC	VC	C	C	C
AIUB8504	XC	XC	XC	VC	VC	VC	VC	C	C	C

AIXR TEEJET® (AIXR)

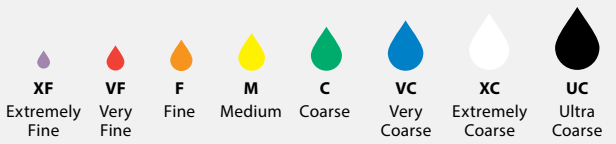
TIP PART NO.	bar										
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
AIXR110015	VC	VC	C	C	C	M	M	M	M	M	M
AIXR11002	XC	VC	VC	C	C	M	M	M	M	M	M
AIXR110025	XC	VC	VC	C	C	M	M	M	M	M	M
AIX11003	XC	VC	VC	C	C	C	M	M	M	M	M
AIXR11004	XC	VC	VC	VC	C	C	C	M	M	M	M
AIXR11005	XC	XC	VC	VC	VC	C	C	C	M	M	M
AIXR11006	XC	XC	VC	VC	VC	VC	C	C	C	C	C
AIXR11008	UC	XC	XC	XC	VC	VC	VC	VC	C	C	C
AIXR11010	UC	XC	XC	XC	VC	VC	VC	VC	VC	VC	C

DG TEEJET® (DG)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
DG80015	M	M	F	F	F
DG110015	M	M	M	M	F
DG8002	C	M	M	M	M
DG11002	C	C	M	M	M
DG8003	C	M	M	M	M
DG11003	C	C	M	M	M
DG8004	C	M	M	M	M
DG11004	C	C	M	M	M
DG8005	C	C	M	M	M
DG11005	C	C	C	M	M

DROP SIZE CLASSIFICATION

DROPLET SIZE CLASSIFICATION



DG TEEJET® (DG E)

TIP PART NO.	bar			
	2	3	3.5	4
DG95015E	M	F	F	F
DG9502E	M	M	M	M
DG9503E	M	M	M	M
DG9504E	C	M	M	M
DG9505E	C	C	M	M

DG TWINJET® (DGTJ60)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
DGTJ60-110015	M	M	F	F	F
DGTJ60-11002	M	M	M	M	M
DGTJ60-11003	M	M	M	M	M
DGTJ60-11004	C	C	C	M	M
DGTJ60-11006	C	C	C	M	M
DGTJ60-11008	C	C	C	M	M

TEEJET® (TP)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
TP80005	F	F	VF	VF	VF
TP110005	VF	VF	VF	VF	VF
TP800067	F	F	F	VF	VF
TP1100067	F	VF	VF	VF	VF
TP8001	F	F	F	F	VF
TP11001	F	F	F	VF	VF
TP80015	F	F	F	F	F
TP110015	F	F	F	F	F
TP8002	M	F	F	F	F
TP11002	F	F	F	F	F
TP8003	M	M	M	F	F
TP11003	M	F	F	F	F
TP8004	M	M	M	M	M
TP11004	M	F	F	F	F
TP8005	M	M	M	M	M
TP11005	M	M	M	M	M
TP8006	C	M	M	M	M
TP11006	M	M	M	M	M
TP8008	C	C	M	M	M
TP11008	M	M	M	M	M
TP8010	C	C	M	M	M
TP11010	C	M	M	M	M
TP8015	VC	C	C	C	C
TP11015	C	C	C	M	M
TP8020	VC	C	C	C	C
TP11020	VC	C	C	C	C

TEEJET (TP E)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
TP8001E	F	F	F	F	VF
TP80015E	F	F	F	F	F
TP8002E	M	F	F	F	F
TP8003E	M	M	F	F	F
TP8004E	M	M	M	M	F
TP8005E	M	M	M	M	M
TP8006E	C	M	M	M	M
TP8008E	C	C	M	M	M
TP8010E	C	C	C	M	M
TP8015E	VC	C	C	C	C
TP8020E	VC	VC	VC	C	C

TK FLOODJET® (TK)

TIP PART NO.	bar											
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	7
TK-1	M	M	M	F	F	F	F	F	F	F	F	F
TK-1.5	M	M	M	M	F	F	F	F	F	F	F	F
TK-2	M	M	M	M	M	F	F	F	F	F	F	F
TK-2.5	M	M	M	M	M	M	M	M	F	F	F	F
TK-3	C	M	M	M	M	M	M	M	M	M	M	M
TK-4	C	M	M	M	M	M	M	M	M	M	M	M
TK-5	C	C	C	M	M	M	M	M	M	M	M	M
TK-7.5	VC	C	C	C	M	M	M	M	M	M	M	M
TK-10	VC	VC	C	C	C	C	C	M	M	M	M	M

TURBO TEEJET® (TT)

TIP PART NO.	bar										
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
TT11001	VC	C	C	M	M	M	M	F	F	F	F
TT110015	VC	VC	C	C	M	M	M	M	M	F	F
TT11002	VC	VC	C	C	M	M	M	M	M	F	F
TT110025	VC	VC	C	C	M	M	M	M	M	F	F
TT11003	XC	VC	C	C	M	M	M	M	M	F	F
TT11004	XC	VC	C	C	M	M	M	M	M	F	F
TT11005	XC	VC	C	C	M	M	M	M	M	F	F
TT11006	XC	VC	C	C	M	M	M	M	M	F	F
TT11008	XC	VC	VC	C	M	M	M	M	M	M	F
TT11010	UC	XC	XC	VC	VC	VC	C	C	C	M	M
TT11012	UC	XC	XC	VC	VC	VC	VC	VC	C	C	C

DROP SIZE CLASSIFICATION

TURBO TEEJET® INDUCTION (TTI)

TIP PART NO.	bar									
	1.0	1.5	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0
TTI11001	UC	UC	XC	XC	VC	VC	VC	VC	VC	C
TTI110015	UC	UC	UC	XC	XC	XC	VC	VC	VC	VC
TTI11002	UC	UC	UC	XC	XC	XC	VC	VC	VC	VC
TTI110025	UC	UC	UC	XC	XC	XC	VC	VC	VC	VC
TTI11003	UC	UC	UC	XC	XC	VC	VC	VC	VC	VC
TTI11004	UC	UC	UC	XC	XC	VC	VC	VC	VC	VC
TTI11005	UC	UC	UC	XC	XC	VC	VC	VC	VC	VC
TTI11006	UC	UC	UC	XC	XC	VC	VC	VC	VC	C
TTI11008	UC	UC	UC	XC	XC	VC	VC	VC	VC	C
TTI11010	UC	UC	UC	XC	XC	VC	VC	VC	VC	C

TTI TWINJET® (TTI60)

TIP PART NO.	bar									
	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	7
TTI60-11002	XC	XC	XC	VC	VC	VC	VC	C	C	C	C
TTI60-110025	XC	XC	XC	VC	VC	VC	VC	C	C	C	C
TTI60-11003	UC	UC	XC	XC	XC	VC	VC	VC	VC	VC	C
TTI60-11004	UC	UC	XC	XC	XC	VC	VC	VC	VC	VC	C
TTI60-11005	UC	UC	XC	XC	XC	VC	VC	VC	VC	VC	C
TTI60-11006	UC	UC	XC	XC	XC	VC	VC	VC	VC	VC	C
TTI60-11008	UC	UC	UC	XC	XC	XC	VC	VC	VC	VC	C

TURFJET (TTJ)

TIP PART NO.	bar							
	1.5	2	2.5	3	3.5	4	4.5	5
1/4TTJ02	UC	XC	XC	XC	VC	VC	VC	VC
1/4TTJ04	UC	UC	UC	UC	UC	UC	UC	UC
1/4TTJ05	UC	UC	UC	UC	UC	UC	UC	UC
1/4TTJ06	UC	UC	UC	UC	UC	UC	UC	UC
1/4TTJ08	UC	UC	UC	UC	UC	UC	UC	UC
1/4TTJ10	UC	UC	UC	UC	UC	UC	UC	UC
1/4TTJ15	UC	UC	UC	UC	UC	UC	UC	UC

TURBO TWINJET® (TTJ60)

TIP PART NO.	bar									
	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
TTJ60-11002	C	C	M	M	M	M	M	M	M	M
TTJ60-110025	VC	C	C	C	M	M	M	M	M	M
TTJ60-11003	VC	C	C	C	M	M	M	M	M	M
TTJ60-11004	VC	C	C	C	M	M	M	M	M	M
TTJ60-11005	VC	C	C	C	M	M	M	M	M	M
TTJ60-11006	VC	C	C	C	M	M	M	M	M	M
TTJ60-11008	VC	C	C	C	M	M	M	M	M	M
TTJ60-110010	VC	VC	C	C	M	M	M	M	M	M

TURBO FLOODJET® (TF-VP)

TIP PART NO.	bar								
	1	1.5	2	2.5	3	3.5	4	4.5	5
TF-VP2	XC	XC	VC	VC	C	C	C	M	M
TF-VP2.5	XC	XC	VC	VC	C	C	C	M	M
TF-VP3	XC	XC	VC	VC	VC	C	C	C	M
TF-VP4	UC	XC	XC	VC	VC	VC	VC	C	C
TF-VP5	UC	XC	XC	VC	VC	VC	VC	C	C
TF-VP7.5	UC	XC	XC	VC	VC	VC	VC	C	C
TF-VP10	UC	XC	XC	VC	VC	VC	VC	C	C

TURBO FLOODJET (TF-VS)

TIP PART NO.	bar								
	1	1.5	2	2.5	3	3.5	4	4.5	5
TF-VS2	UC	UC	XC	VC	VC	VC	VC	C	C
TF-VS2.5	UC	UC	XC	VC	VC	VC	VC	C	C
TF-VS3	UC	UC	XC	XC	VC	VC	VC	C	C
TF-VS4	UC	UC	XC	XC	VC	VC	VC	C	C
TF-VS5	UC	UC	XC	XC	VC	VC	VC	C	C
TF-VS7.5	UC	UC	XC	XC	VC	VC	VC	C	C
TF-VS10	UC	UC	XC	XC	VC	VC	VC	C	C

TX CONEJET® (TX)

TIP PART NO.	bar									
	2	2.5	3	3.5	4	4.5	5	5.5	6	7
TX-1	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-2	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-3	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-4	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-6	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-8	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-10	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-12	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-18	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX-26	F	VF	VF	VF	VF	VF	VF	VF	VF	VF

TX CONEJET® (TXA & TXB)

TIP PART NO.	bar									
	2	2.5	3	3.5	4	4.5	5	5.5	6	7
TX*800050	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*800067	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*8001	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*80015	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*80020	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*80030	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TX*8004	F	VF	VF	VF	VF	VF	VF	VF	VF	VF

*- Specify A or B

TeeJet® DROP SIZE CLASSIFICATION

DROPLET SIZE CLASSIFICATION

XF	VF	F	M	C	VC	XC	UC
Extremely Fine	Very Fine	Fine	Medium	Coarse	Very Coarse	Extremely Coarse	Ultra Coarse

TXR CONEJET® (TXR)

TIP PART NO.	bar									
	2	2.5	3	3.5	4	4.5	5	5.5	6	7
TXR8000553	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR800071	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR8001	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80013	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80015	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80017	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80020	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80028	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80030	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80036	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR8004	F	VF	VF	VF	VF	VF	VF	VF	VF	VF
TXR80049	F	F	VF	VF	VF	VF	VF	VF	VF	VF

TWINJET® (TJ60)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
TJ60-8001	F	F	VF	VF	VF
TJ60-8002	F	F	F	F	F
TJ60-11002	F	F	F	F	F
TJ60-8003	F	F	F	F	F
TJ60-11003	F	F	F	F	F
TJ60-8004	F	F	F	F	F
TJ60-11004	F	F	F	F	F
TJ60-8005	M	M	M	F	F
TJ60-11005	M	M	M	F	F
TJ60-8006	M	M	M	M	M
TJ60-11006	M	M	M	M	M
TJ60-8008	M	M	M	M	M
TJ60-11008	M	M	M	M	M
TJ60-8010	M	M	M	M	M
TJ60-11010	M	M	M	M	M

XR TEEJET® (XR)

TIP PART NO.	bar						
	1	1.5	2	2.5	3	3.5	4
XR8001	F	F	F	F	F	F	F
XR11001	F	F	F	F	F	F	VF
XR80015	M	F	F	F	F	F	F
XR110015	M	F	F	F	F	F	F
XR8002	M	M	F	F	F	F	F
XR11002	M	M	F	F	F	F	F
XR80025	M	M	M	F	F	F	F
XR110025	M	M	M	F	F	F	F
XR8003	M	M	M	M	F	F	F
XR11003	M	M	M	M	F	F	F
XR80035	M	M	M	M	M	F	F
XR8004	M	M	M	M	M	F	F
XR11004	M	M	M	M	M	F	F
XR8005	C	M	M	M	M	M	F
XR11005	M	M	M	M	M	F	F
XR8006	C	C	M	M	M	M	M
XR11006	C	M	M	M	M	M	M
XR8008	VC	C	C	M	M	M	M
XR11008	C	M	M	M	M	M	M
XR8010	VC	C	C	C	M	M	M
XR11010	C	C	C	M	M	M	M
XR8015	XC	VC	VC	C	C	C	M
XR11015	VC	VC	C	C	C	C	M
XR11020	XC	VC	VC	VC	C	C	C

TWINJET® (TJ60 E)

TIP PART NO.	bar				
	2	2.5	3	3.5	4
TJ60-8002E	F	F	F	F	F
TJ60-8003E	F	F	F	F	F
TJ60-8004E	F	F	F	F	F
TJ60-8006E	M	M	M	F	F

XRC TEEJET® (XRC)

TIP PART NO.	bar						
	1	1.5	2	2.5	3	3.5	4
XRC8001	F	F	F	F	F	F	F
XRC11001	F	F	F	F	F	F	VF
XRC80015	M	F	F	F	F	F	F
XRC110015	M	F	F	F	F	F	F
XRC8002	M	M	F	F	F	F	F
XRC11002	M	M	F	F	F	F	F
XRC80025	M	M	M	F	F	F	F
XRC110025	M	M	M	F	F	F	F
XRC8003	M	M	M	M	F	F	F
XRC11003	M	M	M	M	F	F	F
XRC80035	M	M	M	M	M	F	F
XRC8004	M	M	M	M	M	F	F
XRC11004	M	M	M	M	M	F	F
XRC8005	C	M	M	M	M	M	F
XRC11005	M	M	M	M	M	F	F
XRC8006	C	C	M	M	M	M	M
XRC11006	C	M	M	M	M	M	M
XRC8008	VC	C	C	M	M	M	M
XRC11008	C	M	M	M	M	M	M
XRC8010	VC	C	C	C	M	M	M
XRC11010	C	C	C	M	M	M	M
XRC8015	XC	VC	VC	C	C	C	M
XRC11015	VC	VC	C	C	C	C	M
XRC11020	XC	VC	VC	VC	C	C	C

XE TEEJET® (XE)

TIP PART NO.	bar					
	0.5	1	1.5	2	3	4
XE15002	UC	UC	UC	XC	VC	VC
XE15004	UC	UC	UC	XC	VC	VC
XE15006	UC	UC	UC	XC	VC	C
XE15008	UC	UC	UC	XC	VC	C

XP BOOMJET® (XP)

TIP PART NO.	bar				
	1.5	2	3	3.5	4
1/4XP10*	UC	UC	XC	XC	XC
1/4XP20*	UC	UC	XC	XC	XC
1/4XP25*	UC	UC	UC	XC	XC
1/2XP40*	UC	UC	UC	UC	UC
1/2XP80*	UC	UC	UC	UC	UC

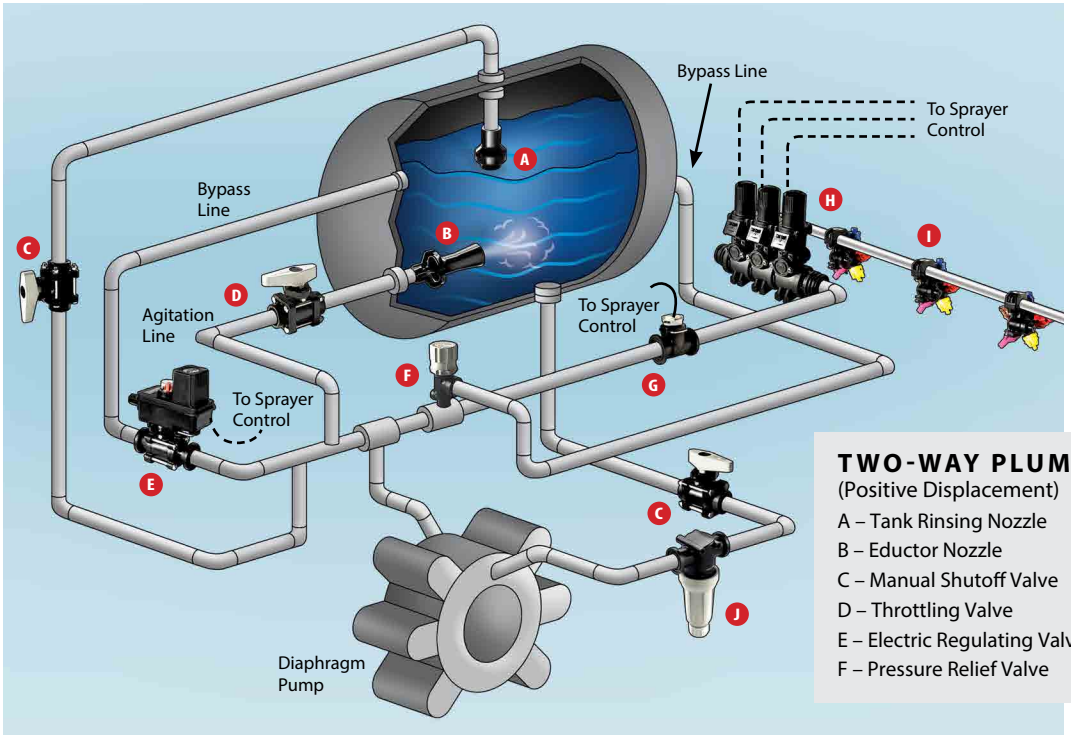
*Specify L or R

TECHNICAL INFORMATION

The following diagrams have been developed to serve as a guideline for plumbing agricultural sprayers. Similar manual valves may be substituted for electric valves. However, the sequence in which these valves occur should remain the same. Note that one of the most common causes of premature valve failure is improper installation.

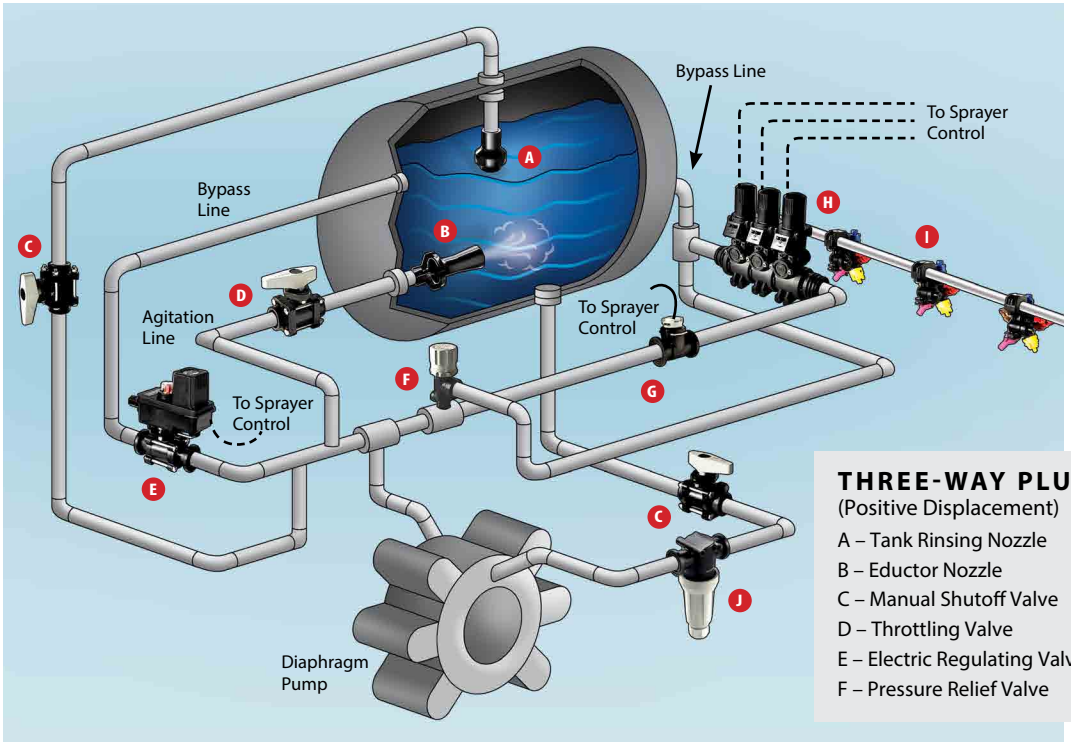
POSITIVE DISPLACEMENT PUMP

Piston, roller and diaphragm pumps are all types of positive displacement pumps. This means that pump output is proportional to speed and virtually independent of pressure. A key component in a positive displacement system is the pressure relief valve. Proper placement and sizing of the pressure relief valve is essential for safe and accurate operation of a positive displacement pump.



TWO-WAY PLUMBING DIAGRAM
(Positive Displacement)

A – Tank Rinsing Nozzle
B – Eductor Nozzle
C – Manual Shutoff Valve
D – Throttling Valve
E – Electric Regulating Valve
F – Pressure Relief Valve
G – Flowmeter
H – 2-Way Boom Control Manifold
I – Nozzle Bodies & Spray Tips
J – Line Strainer

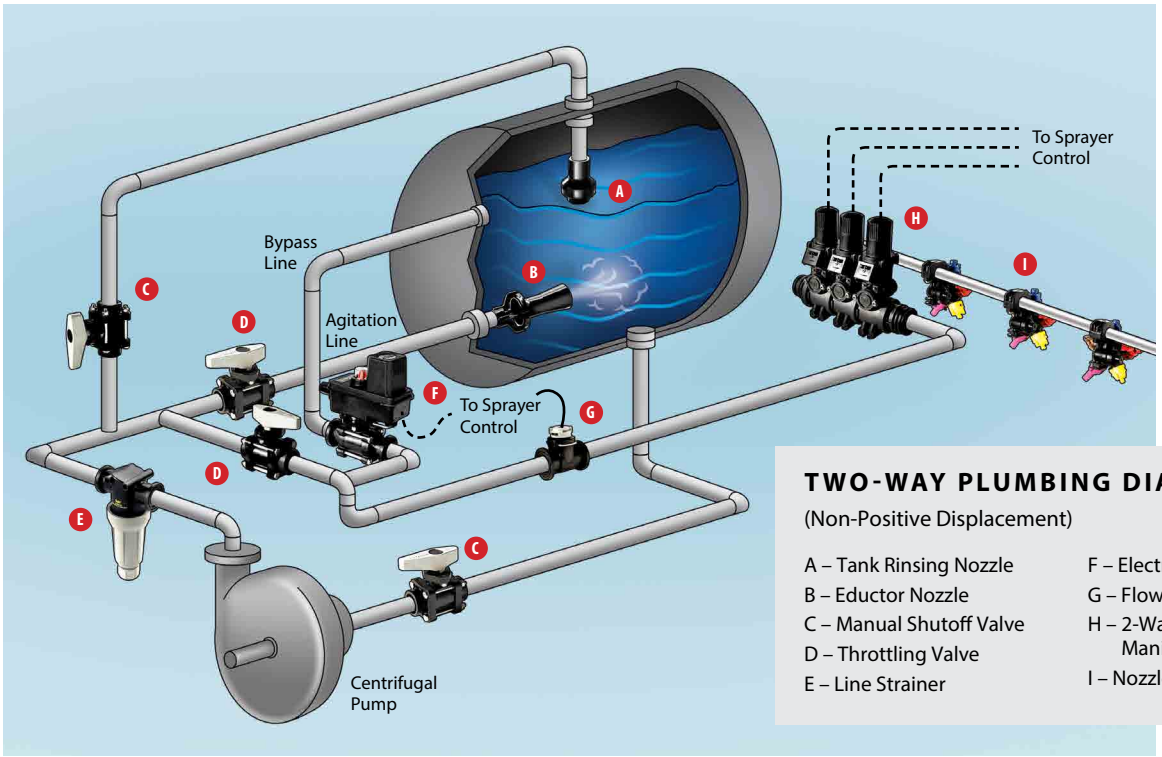


THREE-WAY PLUMBING DIAGRAM
(Positive Displacement)

A – Tank Rinsing Nozzle
B – Eductor Nozzle
C – Manual Shutoff Valve
D – Throttling Valve
E – Electric Regulating Valve
F – Pressure Relief Valve
G – Flowmeter
H – 3-Way Boom Control Manifold
I – Nozzle Bodies & Spray Tips
J – Line Strainer

NON-POSITIVE DISPLACEMENT PUMP

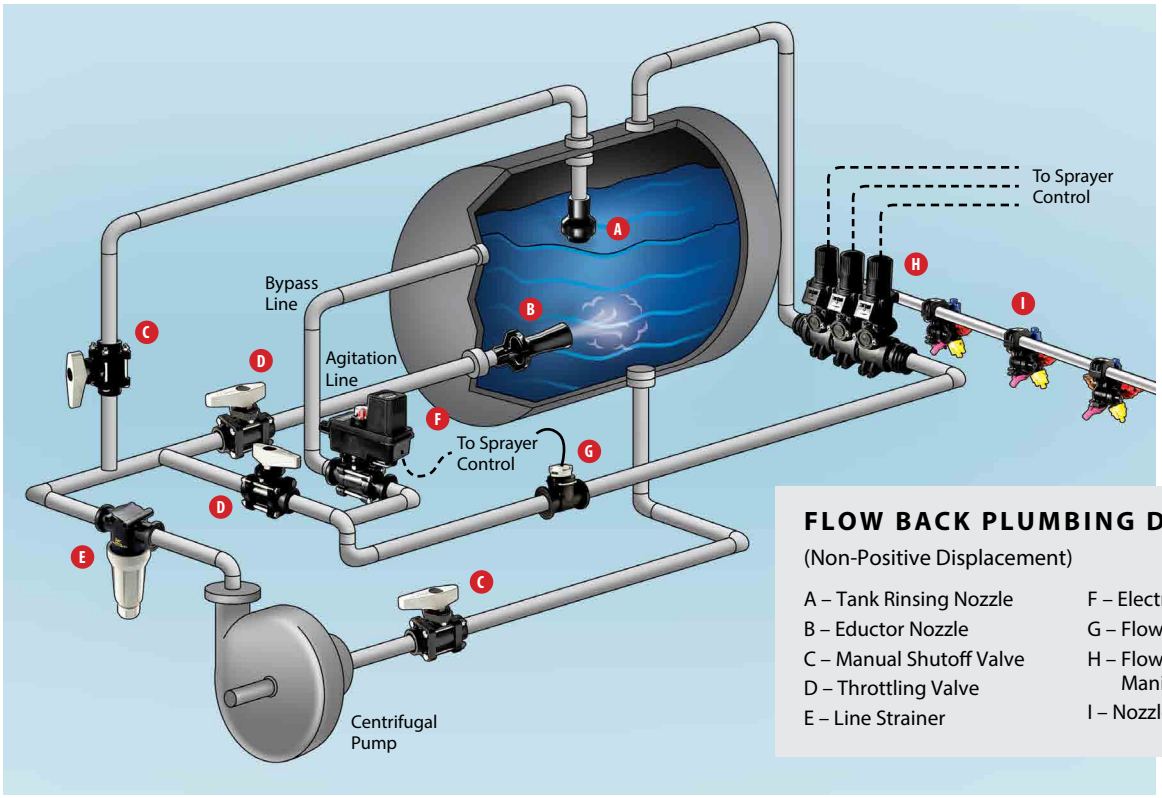
The centrifugal pump is the most common non-positive displacement pump. The output from this type of pump is influenced by pressure. This pump is ideal for delivering large volumes of liquid at low pressures. A key component of the centrifugal pump is the throttling valve. A manual throttling valve on the main output line is essential for the accurate operation of the centrifugal pump.



TWO-WAY PLUMBING DIAGRAM

(Non-Positive Displacement)

A – Tank Rinsing Nozzle
B – Eductor Nozzle
C – Manual Shutoff Valve
D – Throttling Valve
E – Line Strainer
F – Electric Regulating Valve
G – Flowmeter
H – 2-Way Boom Control Manifold
I – Nozzle Bodies & Spray Tips



FLOW BACK PLUMBING DIAGRAM

(Non-Positive Displacement)

A – Tank Rinsing Nozzle
B – Eductor Nozzle
C – Manual Shutoff Valve
D – Throttling Valve
E – Line Strainer
F – Electric Regulating Valve
G – Flowmeter
H – Flow Back Boom Control Manifold
I – Nozzle Bodies & Spray Tips