

396-4116Y1 Metering Tube (8'), LiquiShift, and Split Flow Tube Charts

Low Viscosity (28-0-0 approx 10.7 lb/gal)				Medium-Low Viscosity (32-0-0 approx 11.0 lb/gal)			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	3.5-10	105-295	0.03 - 0.08	Gray	2.5-7.5	74-222	0.02-0.06
Purple	6-20	180-590	0.05 - 0.16	Purple	4.1-15.7	121-464	0.03-0.12
Brown	8-25	235-750	0.06 - 0.20	Brown	5.7-20	170-590	0.04-0.16
Blue	10-31	295-915	0.08 - 0.24	Blue	7.5-25	220-740	0.06-0.20
Green	18-55	530-1600	0.14 - 0.43	Green	14-46	415-1360	0.11-0.36
Tan	25-75	740-2220	0.19 - 0.59	Tan	20-64	590-1890	0.16-0.50
Orange	44-126	1300-3725	0.34 - 0.98	Orange	36-114	1065-3370	0.28-0.89
Yellow	55-154	1625-4555	0.43 - 1.20	Yellow	44-137	1300-4050	0.34-1.07
Black	72-205	2130-6060	0.56 - 1.60	Black	60-175	1775-5175	0.47-1.37
5' Tan	33-100	975-2960	0.26 - 0.78	5' Tan	27-85	800-2515	0.21-0.66
5' Orange	57-165	1685-4880	0.45 - 1.29	5' Orange	49-155	1450-4585	0.38-1.21
5' Yellow	70-200	2070-5915	0.55 - 1.56	5' Yellow	59-185	1745-5470	0.46-1.45
5' Black	95-260	2810-7690	0.74 - 2.03	5' Black	80-235	2365-6950	0.63-1.84

10-60 PSI 60°F

Medium Viscosity (Starter, N-P Blend, approx 11.2 lb/gal)				High Viscosity (10-34-0 approx 11.6 lb/gal) For 11-37-0, find the flow range here, and use next larger tube.			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	1.5-5.0	45-150	0.01-0.04	Gray			
Purple	2.2-11.5	65-340	0.02-0.09	Purple	1-4	30-118	0.008-0.03
Brown	3.5-15	105-445	0.03-0.12	Brown	1.4-6	41-177	0.011-0.05
Blue	5-19.5	150-575	0.04-0.15	Blue	1.8-8	53-237	0.014-0.06
Green	9.5-37	280-1095	0.07-0.29	Green	2.6-14	77-414	0.02-0.11
Tan	14-53	415-1565	0.11-0.41	Tan	4-22	120-650	0.03-0.17
Orange	27-102	800-3015	0.21-0.80	Orange	9-44	265-1300	0.07-0.34
Yellow	33-120	975-3550	0.26-0.94	Yellow	13-61	385-1805	0.10-0.48
Black	48-145	1420-4290	0.38-1.13	Black	18-80	530-2365	0.14-0.63
5' Tan	20-75	590-2220	0.16-0.59	5' Tan	6-31	165-910	0.04-0.24
5' Orange	38-140	1125-4140	0.30-1.09	5' Orange	13-62	375-1820	0.10-0.48
5' Yellow	46-170	1360-5030	0.36-1.33	5' Yellow	18-85	540-2525	0.14-0.67
5' Black	67-200	1980-5915	0.52-1.56	5' Black	25-112	745-3310	0.20-0.88

10-60 PSI 60°F--For 10-34-0 select a tube with additional capacity for cold weather.

Water (8.34 lb/gal)			
	oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range
White	2.5-7.5	75-220	0.02-0.06
Gray	5.8-15.5	170-460	0.045-0.12
Purple	10-26	295-770	0.08-0.20
Brown	12.5-34	370-1005	0.10-0.27
Blue	17.5-45	520-1330	0.14-0.35
Green	26-70	770-2070	0.20-0.55
Tan	34-93	1005-2750	0.27-0.73
Orange	60-159	1775-4700	0.47-1.24
Yellow	75-196	2220-5800	0.59-1.53

These charts are typical flow rates from 10 to 60 PSI.

Electric pumps typically won't operate at 60 psi. See charts on next page for 10 to 40 PSI for typical electric pump operating range.

These charts are designed for typical N-P fertilizers. Suspension, granular, and/or clay-based products may not follow these charts.

These charts are for product at 60° F. Products will be thicker and pressure will be higher at lower temperatures (esp 10-34-0). MAW

Electric Pump (Tower) Systems--10-40 PSI (Tubes 8' unless noted)

Low Viscosity (28-0-0 approx 10.7 lb/gal)				Medium-Low Viscosity (32-0-0 approx 11.0 lb/gal)			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	3.5-7.4	105-220	0.03 - 0.06	Gray	2.5-5.5	74-163	0.02-0.04
Purple	6-14.4	175-415	0.05 - 0.11	Purple	4.1-11.1	121-328	0.03-0.09
Brown	8-18.2	235-540	0.06 - 0.14	Brown	5.7-14.3	170-425	0.04-0.11
Blue	10-22.6	295-670	0.08 - 0.18	Blue	7.5-18	220-530	0.06-0.14
Green	18-40.2	530-1190	0.14 - 0.31	Green	14-33.2	415-980	0.11-0.26
Tan	25-55	740-1625	0.19 - 0.43	Tan	20-46.4	590-1370	0.16-0.36
Orange	44-93.6	1300-2770	0.34 - 0.73	Orange	36-83	1065-2455	0.28-0.65
Yellow	55-114.4	1625-3380	0.43 - 0.89	Yellow	44-100	1300-2955	0.34-0.78
Black	72-152	2130-4495	0.56 - 1.19	Black	60-129	1775-3815	0.47-1.01
5' Tan	33-73	975-2160	0.26 - 0.57	5' Tan	27-63	800-1865	0.21-0.49
5' Orange	57-121	1685-3580	0.45 - 0.95	5' Orange	49-113	1450-3340	0.38-0.88
5' Yellow	70-145	2070-4290	0.55 - 1.13	5' Yellow	59-134	1745-3965	0.46-1.05
5' Black	95-200	2810-5915	0.74 - 1.56	5' Black	80-172	2365-5085	0.63-1.34

10-40 PSI 60°F

Medium Viscosity (Starter, N-P Blend, approx 11.2 lb/gal)				High Viscosity (10-34-0 approx 11.6 lb/gal) For 11-37-0, find the flow range here, and use next larger tube.			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	1.5-3.7	45-110	0.01-0.03	Gray			
Purple	2.2-7.8	65-230	0.02-0.06	Purple	1.0-2.8	30-83	0.008-0.02
Brown	3.5-10.4	105-310	0.03-0.08	Brown	1.4-4.2	41-124	0.011-0.03
Blue	5-13.7	150-405	0.04-0.11	Blue	1.8-5.5	53-163	0.014-0.04
Green	9.5-26	280-770	0.07-0.20	Green	2.6-9.4	77-280	0.02-0.07
Tan	14-37.4	415-1105	0.11-0.29	Tan	4-14.8	120-440	0.03-0.12
Orange	27-72	800-2130	0.21-0.56	Orange	9-30	265-885	0.07-0.23
Yellow	33-85	975-2515	0.26-0.66	Yellow	13-42	385-1240	0.10-0.33
Black	48-106	1420-3135	0.38-0.83	Black	18-55	530-1625	0.14-0.43
5' Tan	20-53	590-1565	0.16-0.41	5' Tan	6-22.2	165-655	0.04-0.17
5' Orange	38-101	1125-2985	0.30-0.79	5' Orange	13-43	380-1270	0.10-0.34
5' Yellow	46-118	1360-3490	0.36-0.92	5' Yellow	18-58	540-1715	0.14-0.45
5' Black	67-148	1980-4375	0.52-1.16	5' Black	25-76	740-2250	0.20-0.59

10-40 PSI 60°F--For 10-34-0 select a tube with additional capacity for cold weather.

Water (8.34 lb/gal)			
	oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range
White	2.5-5.5	75-165	0.02-0.04
Gray	5.8-11.6	170-340	0.045-0.09
Purple	10-20	295-590	0.08-0.16
Brown	12.5-25	370-740	0.10-0.20
Blue	17.5-35	520-1040	0.14-0.28
Green	26-52	770-1540	0.20-0.40
Tan	34-68	1005-2010	0.27-0.54
Orange	60-120	1775-3550	0.47-0.94
Yellow	75-150	2220-44400	0.59-1.18

These charts are typical flow rates from 10 to 40 PSI.

The capacity of electric pumps declines as the pressure increases. If total pump output is low enough, they can operate at 50 psi or more.

These charts are designed for typical N-P fertilizers. Suspension, granular, and/or clay/based products may not follow these charts.

These charts are for product at 60° F. Products will be thicker and pressure will be higher at lower temperatures (esp 10-34-0). MAW



LiquiShift Dual Tube Combinations

Low Viscosity Product (28-0-0) (10.6 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
180-1475	6-50	Purple/Blue
240-2365	8-80	Brown/Green
295-2510	10-85	Blue/Green
295-3105	10-105	Blue/Tan
535-5025	18-170	Green/Orange
535-5765	18-195	Green/Yellow
740-6210	25-210	Tan/Yellow
740-7390	25-250	Tan/Black
1035-8870	35-300	5' Tan/Yellow
1300-9165	44-310	Orange/Black
1035-9610	35-325	5' Tan/Black
1625-10350	55-350	Yellow/Black
1685-11830	57-400	5' Orange/Black
2070-13600	70-460	5' Yellow/Black

Medium-Low Viscosity (32-0-0) (11.0 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
135-1180	4.5-40	Purple/Blue
165-1920	5.7-65	Brown/Green
220-2070	7.5-70	Blue/Green
220-2570	7.5-87	Blue/Tan
415-4495	14-152	Green/Orange
415-5175	14-175	Green/Yellow
590-5620	20-190	Tan/Yellow
590-6210	20-210	Tan/Black
830-7985	28-270	5' Tan/Yellow
1035-8030	35-275	Orange/Black
830-9020	28-305	5' Tan/Black
1300-9020	44-305	Yellow/Black
1420-10795	48-365	5' Orange/Black
1775-12125	60-410	5' Yellow/Black

To calculate Flow (oz/min/row): **Speed (mph) X Rate (gpa) X Row Spacing (in) divided by 46.4**

Calculate Minimum flow using Minimum Speed and Minimum Rate.

Calculate Maximum flow using Maximum Speed and Maximum Rate.

Find the Tube Combination that best covers the Flow Range needed.

10-34-0 gets thicker and harder to push when cold. **Use a larger tube combination when possible for 10-34-0** so it will flow OK when it is cold.

Medium Viscosity (N-P-K Blend, ProGerm-11.2 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
75-885	2.5-30	Purple/Blue
105-1475	3.5-50	Brown/Green
150-1625	5-55	Blue/Green
150-2070	5-70	Blue/Tan
295-3990	10-135	Green/Orange
295-4435	10-150	Green/Yellow
415-5025	14-170	Tan/Yellow
415-5765	14-195	Tan/Black
590-7245	20-245	5' Tan/Yellow
800-7100	27-240	Orange/Black
590-7985	20-270	5' Tan/Black
975-7690	33-260	Yellow/Black
1125-9760	38-330	5' Orange/Black
1360-10795	46-365	5' Yellow/Black

High Viscosity (10-34-0 at 60 deg) (11.65 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
30-325	1-11	Purple/Blue
44-530	1.5-18	Brown/Green
53-590	1.8-20	Blue/Green
53-830	1.8-28	Blue/Tan
75-1480	2.6-50	Green/Orange
75-1920	2.6-65	Green/Yellow
118-2220	4-75	Tan/Yellow
118-2960	4-100	Tan/Black
180-3400	6-115	5' Tan/Yellow
265-3400	9-115	Orange/Black
180-4230	6-143	5' Tan/Black
385-3850	13-130	Yellow/Black
415-4730	14-160	5' Orange/Black
530-5765	18-195	5' Yellow/Black

Tubes may need to be adjusted for best operation with a particular product.

If necessary, system can be operated at 70-90 PSI to achieve high flow rates.

Green/Yellow combination should only be used when maximum range is needed.

LiquiShift Mode Selection should be set at 20-80 PSI for Green/Yellow tubes.

Metering Tubes to use to split the flow to both sides of the row:

(Numbers indicate the **flow range through each tube** in oz/min with a pressure drop from 4 to 15 psi)

LOW VISC	2'	32"	4'
Purple	7-20	6-15	5-11
Blue	12-32	11-25	9-20
Green	24-55	20-47	18-36
Tan	31-73	27-64	24-48
Orange	56-125	47-110	41-83
Yellow	71-153	60-135	53-104
Black	91-205	76-175	68-133
MID VISC	2'	32"	4'
Purple	4-11	3-9	2-6
Blue	7-20	5-15	4-11
Green	14-36	10-30	8-23
Tan	20-55	15-44	12-31
Orange	37-100	30-84	26-62
Yellow	46-120	36-102	30-75
Black	65-145	52-130	45-100
HIGH VISC	2'	32'	4'
Purple	1-4	0.9-3	0.6-2
Blue	2-8	1.8-6	1.6-4
Green	4-14	3-11	2.5-9
Tan	6-22	4.5-17	3.8-11.5
Orange	14-44	10.5-36	8-25
Yellow	19-61	15-49	12-34
Black	27-80	21-65	16-49
WATER	2'	32'	4'
White	3.5-7.5	3-5.8	2.5-5
Gray	7-15	6-13	5-11
Purple	13-26	11-23	9-18
Blue	22-40	19-39	16-31
Green	33-70	28-60	25-48
Tan	43-93	37-80	32-64

(32" tube is an 8' tube cut into 3 pieces)

VISC	EX	LB/ GAL	SP GR
LOW	28-0-0	10.7	1.29
MID	9-24-3	11.2	1.34
HIGH	10-34-0	11.6	1.39

As with all metering tube recommendations, these charts should provide a starting point, but adjustments may need to be made in the field.

When doing a split at the row, we are trying to provide paths of equal resistance (and equal flow) to each side of the row, while keeping the pressure drop in this step as small as possible.

In general, use as large a tube (and / or as short a tube) as possible to minimize the pressure drop caused by splitting the flow. In other words, if possible, use the tube that matches up best at the low end of the range on the chart, rather than at the high end.

A compromise may need to be made in LiquiShift systems that have a wide flow range that extends beyond a selection on the chart.

