SHATTUC™
CORD SPECIALTIES, INC.

CALL TOLL FREE: 866.SHATTUC
MAIN: 847.360.9500
FAX: 847.360.9599

info@shattuc.com | www.shattuc.com

CABLE BUILD UP CHARTS

Cabling is performed when there is a requirement to twist two or more insulated conductors together. The equipment used to perform this operation varies according to the number and type of insulated conductors. There are many factors to consider before designing a cable for this operation. Some of these include flexibility, physical abuse, appearance, strength, diameter, weight and electrical properties.

These tables are for you to use in determining the diameters of cables where you have multiple single or twisted pair wires of equal size to be formed into a cable. If you need a composite construction (with many different sized components), please contact our engineering department for assistance.

CABLE BUNDLE DIAMETER CHART (SINGLE WIRE OR TWISTED PAIR COMPONENTS)

	M Factor			M Factor			M Factor			M Factor	
Number of Components	Single Wires	Twisted Pairs	Number of Components	Single Wires	Twisted Pairs	Number of Components	Single Wires	Twisted Pairs	Number of Components	Single Wires	Twisted Pairs
1	1.00	2.0	26	5.86	9.6	51	8.21	13.0	76	10.03	15.9
2	1.64	3.5	27	5.98	9.8	52	8.29	13.2	77	10.09	15.9
3	2.17	3.8	28	6.09	9.9	53	8.37	13.3	78	10.16	15.9
4	2.42	4.2	29	6.19	10.0	54	8.45	13.3	79	10.22	16.0
5	2.57	4.8	30	6.30	10.0	55	8.53	13.4	80	10.29	16.2
6	2.82	5.0	31	6.40	10.2	56	8.61	13.8	81	10.35	16.3
7	3.00	5.0	32	6.51	10.3	57	8.68	13.9	82	10.41	16.3
8	3.25	5.6	33	6.60	10.4	58	8.76	13.9	83	10.48	16.3
9	3.45	6.0	34	6.71	10.8	59	8.83	13.9	84	10.54	16.4
10	3.64	6.5	35	6.80	10.9	60	8.91	14.0	85	10.60	16.8
11	3.81	6.6	36	6.90	10.9	61	8.98	14.0	86	10.67	16.9
12	3.98	6.8	37	6.99	11.0	62	9.06	14.1	87	10.73	16.9
13	4.15	6.9	38	7.09	11.0	63	9.13	14.1	88	10.79	16.9
14	4.30	7.2	39	7.18	11.1	64	9.20	14.2	89	10.85	16.9
15	4.45	7.4	40	7.27	11.2	65	9.27	14.6	90	10.91	17.0
16	4.60	7.8	41	7.36	11.6	66	9.34	14.7	91	10.97	17.0
17	4.75	7.9	42	7.45	11.7	67	9.41	14.7	92	11.03	17.1
18	4.88	8.0	43	7.54	11.8	68	9.48	14.8	93	11.09	17.1
19	5.01	8.0	44	7.83	12.0	69	9.55	15.0	94	11.15	17.1
20	5.14	8.2	45	7.71	12.5	70	9.62	15.5	95	11.21	17.2
21	5.27	8.6	46	7.80	12.6	71	9.69	15.6	96	11.27	17.6
22	5.39	8.8	47	7.88	12.7	72	9.76	15.6	97	11.33	17.7
24	5.63	9.5	49	8.05	12.9	74	9.89	15.7	99	11.44	17.7
25	5.75	9.8	50	8.13	12.9	75	9.96	15.8	100	11.50	-

NOTES:

A) A bundled or bunched cable will give the smallest diameter, but conductor position and appearance are difficult to control.

B) **EXAMPLE:** 18 single conductors, each .080" diameter (O.D. = M factor x .080" = 88 x .080" = .390")

SHATTUC™
CORD SPECIALTIES, INC.

CALL TOLL FREE: 866.SHATTUC
MAIN: 847.360.9500
FAX: 847.360.9599

info@shattuc.com | www.shattuc.com

TWISTED PAIR CABLES (LAYUP AND DIAMETER FACTORS)

Total Conds.	M Factor	Number of Conductors per layer				Total Conds.	M Factor	Number of Conductors per layer					
		Core	1st	2nd	3rd			Core	1st	2nd	3rd	4th	5th
1	2.0	1				51	13.0	3	10	16	22		
2	3.5	2				52	13.2	4	10	16	22		
3	3.76	3				53	13.3	4	10	16	23		
4	4.20	4				54	13.3	4	10	17	23		
5	4.8	5				55	13.4	4	12	17	23		
6	5.00	0	6			56	13.4	5	11	17	23		
7	5.00	1	6			57	13.8	5	11	17	24		
8	5.60	1	7			58	13.9	5	11	18	24		
9	6.00	1	8			59	13.9	5	12	18	24		
10	6.50	2	8			60	14.0	0	6	12	18	24	
11	6.6	2	9			61	14.0	1	6	12	18	24	
12	6.8	3	9			62	14.1	1	6	12	18	25	
13	6.9	3	10			63	14.1	1	6	12	19	25	
14	7.20	4	10			64	14.2	1	6	13	19	25	
15	7.40	4	11			65	14.6	1	7	13	19	25	
16	7.8	5	11			66	14.7	1	7	13	19	26	
17	7.9	5	12			67	14.7	1	7	13	20	26	
18	8.00	0	6	12		68	14.8	1	7	14	20	26	
19	8.00	1	6	12		69	15.0	1	8	14	20	26	
20	8.2	1	6	13		70	15.5	2	8	14	20	26	
21	8.6	1	7	13		71	15.6	2	8	14	20	27	
22	8.8	1	7	14		72	15.6	2	8	14	21	27	
23	9.0	1	8	14		73	15.6	2	8	15	21	27	
24	9.5	2	8	14		74	15.7	2	9	15	21	27	
25	9.6	2	8	15		75	15.8	3	9	15	21	27	
26	9.6	2	9	15		76	15.9	3	9	15	21	28	
27	9.8	3	9	15		77	15.9	3	9	15	22	28	
28	9.9	3	9	16		78	15.9	3	9	16	22	28	
29	10.0	3	10	16		79	16.0	3	10	16	22	28	
30	10.2	4	10	16		80	16.2	4	10	16	22	28	
31	10.3	4	10	17		81	16.3	4	10	16	22	29	
32	10.4	4	11	17		82	16.3	4	10	16	23	29	
33	10.8	5	11	17		83	16.3	4	10	17	23	29	

Continued on next page

SHATTUC™
CORD SPECIALTIES, INC.

CALL TOLL FREE: 866.SHATTUC
MAIN: 847.360.9500
FAX: 847.360.9599

info@shattuc.com | www.shattuc.com

TWISTED PAIR CABLES (LAYUP AND DIAMETER FACTORS) - CONTINUED

Total Conds.	M Factor	Number of Conductors per layer				Total Conds.	M Factor	Number of Conductors per layer					
		Core	1st	2nd	3rd			Core	1st	2nd	3rd	4th	5th
34	10.9	5	11	18		84	16.4	4	11	17	23	29	
35	10.9	5	12	18		85	16.8	5	11	17	23	29	
36	11.0	0	6	12	18	86	16.9	5	11	17	23	30	
37	11.0	1	6	12	18	87	16.9	5	11	17	24	30	
38	11.1	1	6	12	19	88	16.9	5	11	18	24	30	
39	11.2	1	6	13	19	89	16.9	5	12	18	24	30	
40	11.6	1	7	13	19	90	17.0	0	6	12	18	24	30
41	11.7	1	7	13	20	91	17.0	1	6	12	18	24	30
42	11.8	1	7	14	20	92	17.1	1	6	12	18	24	31
43	12.0	1	8	14	20	93	17.1	1	6	12	18	25	31
44	12.5	2	8	14	20	94	17.1	1	6	12	19	25	31
45	12.6	2	8	14	21	95	17.2	1	6	13	19	25	31
46	12.6	2	8	15	21	96	17.6	1	7	13	19	25	31
47	12.7	2	9	15	21	97	17.7	1	7	13	19	25	32
48	12.8	3	9	15	21	98	17.7	1	7	13	19	26	32
49	12.9	3	9	15	22	99	17.7	1	7	13	20	26	32
50	12.9	3	9	16	22	100	17.8	1	7	14	20	26	32

NOTES:

A) The above table considers a unilay construction (equal direction and lay length of all layers).

B) If lay direction for each succeeding layer is reversed, add 10% to the factor.

C) If the length of lay of the individual twisted pairs is less than 25 times the diameter of one insulated wire, add 10% to the factor.

D) **EXAMPLE:** 19 pair cable, .080" individual wire diameter with each layer being reversed in direction of lay.
Diameter = (Factor + 10%) x .080" = (8.0 + .8) x .080" = .704" Layup = Core-1 Pair, Firest Layer-8 Pair, Outer Layer-12 Pair

SHATTUC™
CORD SPECIALTIES, INC.

CALL TOLL FREE: 866.SHATTUC
MAIN: 847.360.9500
FAX: 847.360.9599

info@shattuc.com | www.shattuc.com

CONCENTRIC CABLE DIAMETER FACTORS AND LAYUP

Total Conds.	M Factor	Number of Conductors per layer				Total Conds.	M Factor	Number of Conductors per layer					
		Core	1st	2nd	3rd			Core	1st	2nd	3rd	4th	5th
1						51	8.41	3 + f	10	16	22		
2	2.00	2				52	8.41	4	10	16	22		
3	2.15	3				53	8.70	4 + 2f	10 + f	16 + f	23		
4	2.41	4				54	8.70	4 + 2f	10 + f	17	23		
5	2.70	5				55	8.70	4 + 2f	11	17	23		
6	3.00	6				56	8.70	5 + f	11	17	23		
7	3.00	1	6			57	9.00	f	5 + f	11 + f	17 + f	24	
8	3.31	1 + f	7			58	9.00	f	5 + f	11 + f	18	24	
9	3.62	1 + f	8			59	9.00	f	5 + f	12	18	24	
10	4.00	2	8			60	9.00	f	6	12	18	24	
11	4.00	2 + f	9			61	9.00	1	6	12	18	24	
12	4.15	3	9			62	9.31	f	6+ f	12 + f	19	25	
13	4.41	3 + f	10			63	9.31	f	6+ f	13	19	25	
14	4.41	4	10			64	9.31	f	7	13	19	25	
15	4.70	4 + 2f	11			65	9.31	1 + f	7	13	19	25	
16	4.70	5 + f	11			66	9.62	f	7 + f	13 + f	20	26	
17	5.00	5 + 2f	12			67	9.62	f	7 + f	14	20	26	
18	5.00	6 + f	12			68	9.62	f	8	14	20	26	
19	5.00	1	6	12		69	9.62	1 + f	8	14	20	26	
20	5.31	f	7	13		70	10.00	1 + f	8 + f	14 + f	20 + f	27	
21	5.31	1 + f	7	13		71	10.00	1 + f	8 + f	14 + f	21	27	
22	5.62	f	8	14		72	10.00	1 + f	8 + f	15	21	27	
23	5.62	1 + f	8	14		73	10.00	1 + f	9	15	21	27	
24	6.00	2	8	14		74	10.00	2	9	15	21	27	
25	6.00	2	8	15		75	10.20	2 + f	8 + f	15	22	28	
26	6.00	2 + f	9	15		76	10.20	2 + f	9	15	22	28	
27	6.15	3	9	15		77	10.20	3	9	15	22	28	
28	6.41	3 + f	9 + f	16		78	10.41	3 + f	9 + f	15 + f	22 + f	29	
29	6.41	3 + f	10	16		79	10.41	3 + f	9 + f	15 + f	23	29	
30	6.41	4	10	16		80	10.41	3 + f	9 + f	16	23	29	
31	6.70	4 + 2f	10 + f	17		81	10.41	3 + f	10	16	23	29	
32	6.70	4 + 2f	11	17		82	10.41	4	10	16	23	29	
33	6.70	5 + f	11	17		83	10.70	4 + f	10 + f	17	23	29	

Continued on next page

SHATTUC™
CORD SPECIALTIES, INC.

CALL TOLL FREE: 866.SHATTUC
MAIN: 847.360.9500
FAX: 847.360.9599

info@shattuc.com | www.shattuc.com

CONCENTRIC CABLE DIAMETER FACTORS AND LAYUP - CONTINUED

Total Conds.	M Factor	Number of Conductors per layer				Total Conds.	M Factor	Number of Conductors per layer					
		Core	1st	2nd	3rd			Core	1st	2nd	3rd	4th	5th
34	7.00	f	5 + f	11 + f	18	84	10.70	4 + f	11	17	23	29	
35	7.00	f	5 + f	12	18	85	10.70	5 + f	11	17	23	29	
36	7.00	f	6	12	18	86	11.00	f	5 + f	11 + f	17 + f	23 + f	30
37	7.00	1	6	12	18	87	11.00	f	5 + f	11 + f	17 + f	24	30
38	7.31	f	6 + f	13	19	88	11.00	f	5 + f	11 + f	18	24	30
39	7.31	f	7	13	19	89	11.00	f	5 + f	12	18	24	30
40	7.31	1 + f	7	13	19	90	11.00	f	6	12	18	24	30
41	7.62	f	7 + f	14	20	91	11.00	1	6	12	18	24	30
42	7.62	f	8	14	20	92	11.31	f	6 + f	12 + f	19	25	30
43	7.62	1 + f	8	14	20	93	11.31	f	6 + f	13	19	25	30
44	8.00	1 + f	8 + f	14 + f	21	94	11.31	f	7	13	19	25	30 + f
45	8.00	1 + f	8 + f	15	21	95	11.31	1 + f	7	13	19	25	30 + f
46	8.00	1 + f	9	15	21	96	11.62	f	7 + f	13 + f	20	26	30 + f
47	8.00	2	9	15	21	97	11.62	f	7 + f	14	20	26	30 + f
48	8.15	3	9	15	21	98	11.62	f	8	14	20	26	30 + f
49	8.15	3	9	15	22	99	11.62	1 + f	8	14	20	26	30 + f
50	8.41	3 + f	9 + f	16	22	100	12.00	1 + f	8 + f	14 + f	20 + f	27	30 + f

NOTES:

A) f = fillers

B) Concentric layers will give a slightly increased diameter in lieu of bundled or bunched, but it will produce consistant positioning of wires and a smooth round appearance.

C) Diameter is calculated by multiplying M factor times diameter of one component.