SECTION 19 : WIRE TABLES*

TABLE 62

Bare Copper Wire, A.W.G. (20° C. = 68° F.)

AWG No.	Diameter Mils	Area Circular Mils	Area Square Inches	Ohms per 1000 Feet	Ohms per Pound	Feet per Pound	Pounds per 1000 Feet
0000	460	211 600	.166 2	.04901	.000 076 52	1.561	640.5
000	410	167 800	.131 8	.06180	.000 121 7	1.968	507.9
00	364.8	133 100	.104 5	.07793	.000 193 5	2.482	402.8
0	324.9	105 500	.082 89	.09827	.000 307 6	3.130	319.5
1	289.3	83 700	.065 73	.1239	.000 489 1	3.947	253.3
2	257.6	66 400	.052 13	.1563	.000 777 8	4.977	200.9
3	229.4	52 600	.041 34	.1970	.001 237	6.276	159.3
4	204.3	41 700	.032 78	.2485	.001 966	7.914	126.4
5	181.9	33 100	.026 00	.3133	.003 127	9.980	100.2
6	162.0	26 250	.020 62	.3951	.004 972	12.58	79.46
7	144.3	20 820	.016 35	.4982	.007 905	15.87	63.02
8	128.5	16 510	.012 97	.6282	.012 57	20.01	49.98
9	114.4	13 090	.010 28	.7921	.019 99	25.23	39.63
10	101.9	10 380	.008 155	.9989	.031 78	31.82	31.43
11	90.7	8 230	.006 467	1.260	.050 53	40.12	24.92
12	80.8	6 530	.005 129	1.588	.080 35	50.59	19.77
13	72.0	5 180	.004 067	2.003	.1278	63.80	15.68
14	64.1	4 110	.003 225	2.525	.2032	80.44	12.43
15	57.1	3 257	.002 558	3.184	.3230	101.4	9.858
16	50.8	2 583	.002 028	4.016	.5136	127.9	7.818
17	45.3	2 048	.001 609	5.064	.8167	161.3	6.200
18	40.3	1 624	.001 276	6.385	1.299	203.4	4.917
19	35.89	1 288	.001 012	8.051	2.065	256.5	3.899
20	31.96	1 022	.000 802 3	10.15	3.283	323.4	3.092
21	28.46	810	.000 636 3	12.80	5.221	407.8	2.452
22	25.35	642	.000 504 6	16.14	8.301	514.2	1.945
23	22.57	509	.000 400 2	20.36	13.20	648.4	1.542
24	20.10	404	.000 317 3	25.67	20.99	817.7	1.223
25	17.90	320.4	.000 251 7	32.37	33.37	1 031.0	0.9699
26	15.94	254.1	.000 199 6	40.81	53.06	1 300	0.7692
27	14.20	201.5	.000 158 3	51.47	84.37	1 639	0.6100
28	12.64	159.8	.000 125 5	64.90	134.2	2 067	0.4837
29	11.26	126.7	.000 099 53	81.83	213.3	2 607	0.3836
30	10.03	100.5	.000 078 94	103.2	339.2	3 287	0.3042
31	8.928	79.70	.000 062 60	130.1	539.3	4 145	0.2413
32	7.950	63.21	.000 049 64	164.1	857.6	5 227	0.1913
33	7.080	50.13	.000 039 37	206.9	1 364.0	6 591	0.1517
34	6.305	39.75	.000 031 22	260.9	2 168	8 310	0.1203
35	5.615	31.52	.000 024 76	329.0	3 448	10 480	0.095 42
36	5.000	25.00	.000 019 64	414.8	5 482	13 210	.075 68
37	4.453	19.83	.000 015 57	532.1	8 717	16 660	.060 01
38	3.965	15.72	.000 012 35	659.6	13 860	21 010	.047 59
39	3.531	12.47	.000 009 793	831.8	22 040	26 500	.037 74
40	3.145	9.888	.000 007 766	1 049.0	35 040	33 410	.029 93
(41)	2.75	7.5625	.000 005 940	1 370	59 990	43 700	.022 89
(42)	2.50	6.2500	.000 004 909	1 660	87 700	52 800	.018 93
(43)	2.25	5.0625	.000 003 976	2 050	133 700	65 300	.015 32
(44)	2.00	4.0000	.000 003 142	2 600	214 000	82 600	.012 11
(45)	1.75	3.0625	.000 002 405	3 390	356 200	107 900	.009 27
(46)	1.50	2.2500	.000 001 767	4 610	676 800	146 800	.006 81

*See also A. F. Maine "Rapid coil calculations for magnetic devices" Jour. Brit. I.R.E. 12.7 (July 1952) 403 for nomographs.

Table 63

Bare Copper Wire S.W.G. (60° F)

SWG No.	Diameter Mils.	Area Circular Mils.	Area Square Inches	Ohms per 1000 Feet	Ohms per Pound	Feet per Pound	Pounds per 1000 Feet
4/0	400	160 000	.125 66	.06368	.000 131 46	2.064	484.4
3/0	372	138 400	.108 69	.0736	.000 175 74	2.390	418.9
2/0	348	121 100	.095 11	.0841	.000 229 5	2.730	366.7
1/0	324	105 000	.082 45	.0971	.000 305 4	3.147	317.8
1	300	90 000	.070 69	.1132	.000 415 5	3.670	272.5
2	276	76 180	.059 83	.1338	.000 580 0	4.338	230.6
3	252	63 500	.049 88	.1605	.000 834 5	5.200	192.3
4	232	53 820	.042 27	.1893	.001 161 7	6.139	162.9
5	212	44 940	.035 30	.2267	.001 666 1	7.348	136.1
6	192	36 860	.028 95	.2764	.002 476	8.961	111.6
7	176	30 980	.024 33	.3289	.003 507	10.66	93.8
8	160	25 600	.020 11	.3980	.005 135	12.90	77.5
9	144	20 740	.016 286	.4914	.007 827	15.93	62.78
10	128	16 380	.012 868	.6219	.012 537	20.16	49.61
11	116	13 460	.010 568	.7570	.018 587	24.55	40.74
12	104	10 820	.008 495	.942	.028 77	30.54	32 75
13	92	8 464	.006 648	1.204	.046 98	39.01	25.63
14	80	6 400	.005 027	1.592	.082 16	51.60	19.38
15	72	5 184	.004 072	1.966	.125 23	63.73	15.69
16	64	4 096	.003 217	2.488	.2006	80.65	12.40
17	56	3 136	.002 463	3.249	.3422	105.4	9.49
18	48	2 304	.001 809 6	4.422	.6340	143.3	6.98
19	40	1 600	.001 256 6	6.368	1.3146	206.4	4.844
20	36	1 296	.001 017 9	7.860	2.004	254.8	3.924
21	32	1 024	.000 804 2	9.950	3.209	322.6	3.100
22	28	784	.000 615 8	12.997	5.475	421.2	2.374
23	24	576	.000 452 4	17.69	10.144	573.4	1.744
24	22	484	.000 380 1	21.05	14.366	682.6	1.465
25	20	400	.000 314 2	25.47	21.03	825.8	1 211
26	18	324	.000 254 5	31.45	32.06	1 019	0.981
27	16.4	269	.000 211 2	37.88	46.52	1 229	0.814
28	14.8	219	.000 172 03	46.52	70.14	1 508	0.6632
29	13.6	185	.000 145 27	55.09	98.37	1 786	0.5600
30	12.4	153.8	.000 120 76	66.27	142.35	2 148	0.4655
31	11.6	134.6	.000 105 68	75.7	185.87	2 455	0.4074
32	10.8	116.6	.000 091 61	87.4	247.4	2 832	0.3531
33	10.0	100.0	.000 078 54	101.9	336.5	3 302	0.3028
34	9.2	84.64	.000 066 48	120.4	469.8	3 901	0.2563
35	8.4	70.56	.000 055 42	144.4	676.0	4 682	0.2136
36	7.6	57.76	.000 045 36	176.4	1 008.7	5 718	0.1749
37	6.8	46.24	.000 036 32	220.4	1 574	7 143	0.1400
38	6.0	36.00	.000 028 27	283.0	2 596	9 174	0.1090
39	5.2	27.04	.000 021 24	376.8	4 603	12 210	0.0819
40	4.8	23.04	.000 018 096	442.2	6 340	14 330	0.0698
41	4.4	19.36	.000 015 205	526.3	8 979	17 060	0.058 62
42	4.0	16.00	.000 012 566	636.8	13 146	20 640	.048 44
43	3.6	12.96	.000 010 179	786.3	20 040	25 480	.039 24
44	3.2	9.734	.000 008 042	995.0	32 090	32 260	.031 00
45	2.8	7.840	.000 006 158	1 299.7	54 750	42 120	.023 74
46	2.4	5.760	.000 004 524	1 769	101 440	57 340	.017 44
47	2.0	4.000	.000 003 142	2 547	210 300	82 580	.012 11
48	1.6	2.560	.000 002 011	3 980	513 500	129 000	.007 75
49	1.2	1.440	.000 001 131	7 077	1 623 000	229 400	.004 36
50	1.0	1.000	.000 000 785 4	10 190	3 365 000	303 000	.003 03

TABLE 64
TURNS PER INCH AND INSULATED WIRE DIAMETER A.W.G. COPPER WIRE

AWG No.	Diameter (mils)		Turns per inch (exact winding)					
	*Enam.	D.C.C.	Bare	Enam.	S.C.C.	D.C.C.	S.S.C.	D.S.C.
8	130.6	142.5	7.78	7.65	7.32	7.01	—	—
9	116.5	126.4	8.74	8.58	8.23	7.91	—	—
10	104.0	112.9	9.81	9.61	9.26	8.85	—	—
11	92.7	100.2	11.02	10.7	10.4	9.98	—	—
12	82.8	90.3	12.37	12.0	11.6	11.07	—	—
13	74.0	81.5	13.89	13.5	12.9	12 27	—	—
14	66.1	73.6	15.60	15.1	14.4	13.59	—	—
15	59.1	66.6	17.52	16.9	16.1	15.0	—	—
16	52.8	60.3	19.68	18.9	17.9	16.5	18.9	18.2
17	47.1	54.8	22.1	21.2	19.8	18.2	21.1	20.2
18	42.1	49.8	24.8	23.7	22.0	20 0	23.6	22.5
19	37.7	45.4	27.8	26.5	24.4	22.0	26.3	25.0
20	33.8	41.5	31.3	29.5	27.0	24.1	29.4	27.7
21	30.2	38.0	35.1	33.1	29.8	26.3	32.7	30.7
22	27.0	33.8	39.4	37.0	33.5	29.5	36.6	34.1
23	24.1	31.1	44.3	41.4	36.9	32.1	40.6	37.5
24	21.5	28.6	49.7	46.5	40.6	34.9	45.2	41.4
25	19.2	26.4	55.8	52.0	44.6	37.8	50.0	45.6
26	17.1	24.4	62.7	58.4	49.0	40.9	55.8	50.0
27	15.3	22.7	70.4	65.3	53.4	44.0	61.7	54.9
28	13.6	21.1	82.8	73.5	58.4	47.3	68.4	60.2
29	12.2	19.8	88.8	81.9	63.2	50.5	75.1	65.3
30	10.8	18.5	99.7	92.5	68.9	54.0	83.3	71.4
31	9.7	17.4	112.0	103	74.6	57.4	91.7	77.5
32	8.7	16.5	125.8	114	80.0	60.6	100	83.3
33	7.7	15.6	141.2	129	86.2	64.1	109	90.0
34	6.9	14.8	158.6	144	92.5	67.5	120	97.0
35	6.2	14.1	178	161	99.9	70.9	131	104
36	5.5	13.0	200	181	111	76.9	142	111
37	4.9	12.5	224	204	117	80.0	153	117
38	4.4	12.0	252	227	125	83.3	166	125
39	3.9	11.5	283	256	133	86.9	181	133
40	3.5	11.1	318	285	140	90.0	196	140
(41)	3.05	—	363	327	—	—	—	—
(42)	2.64	—	400	378	—	—	—	—
(43)	2.37	—	444	421	—	—	—	—
(44)	2.12	—	500	471	—	—	—	—
(45)	1.91	—	571	523	—	—	—	—
(46)	1.72	—	666	581	—	—	—	—

*Nominal Value. Actual dimensions vary slightly.

TABLE 65
TURNS PER INCH AND INSULATED WIRE DIAMETER, S.W.G. COPPER WIRE

SWG No.	Diameter (mils)		Turns per inch (exact winding)					
	*Enam.	D.C.C.	Bare	Enam.	S.C.C.	D.C.C.	S.S.C.	D.S.C.
10	132	142	7.81	7.63	7.35	7.04	—	—
11	120	130	8.62	8.33	8.07	7.69	—	—
12	108	118	9.62	9.26	8.93	8.48	—	—
13	96	106	10.87	10.42	10.00	9.43	—	—
14	84	94	12.50	11.90	11.36	10.64	—	—
15	75.5	84	13.89	13.25	12.66	11.90	—	—
16	67.5	76	15.63	14.81	14.08	13.16	14.93	14.71
17	59	68	17.86	16.95	15.87	14.71	16.95	16.67
18	50.7	59	20.83	19.72	18.18	16.95	20.00	19.61
19	42.6	51	25.00	23.47	21.28	19.61	23.81	23.26
20	38.5	47	27.78	25.97	23.81	21.28	26.32	25.64
21	34.3	43	31.25	29.15	26.32	23.26	29.41	28.57
22	30.0	39	35.71	33.33	29.41	25.64	33.33	32.26
23	25.7	34	41.67	38.91	34.48	29.41	38.46	37.04
24	23.6	32	45.45	42.37	37.04	31.25	42.55	40.00
25	21.5	30	50.00	46.51	40.00	33.33	46.51	43.48
26	19.4	28	55.56	51.55	43.48	35.71	51.81	48.78
27	17.7	26.4	60.98	56.50	46.73	37.88	56.50	52.91
28	16.0	24.8	67.57	62.50	50.51	40.32	62.11	57.80
29	14.8	23.6	73.53	67.57	53.76	42.37	67.11	62.11
30	13.4	22.4	80.65	74.63	57.47	44.64	72.99	67.11
31	12.6	21.6	86.21	79.37	60.24	46.30	77.52	70.92
32	11.7	20.8	92.59	85.47	63.29	48.08	82.64	75.19
33	10.9	20.0	100.00	91.74	66.67	50.00	88.50	80.00
34	10.0	19.2	108.7	100.0	70.42	52.08	95.24	85.47
35	9.1	17.4	119.0	109.9	80.65	57.47	103.1	91.74
36	8.3	16.6	131.6	120.5	86.21	60.24	112.4	99.01
37	7.4	15.8	147.1	135.1	99.21	63.29	123.5	107.5
38	6.6	15.0	166.7	151.5	100.0	66.67	137.0	117.6
39	5.7	14.2	192.3	175.4	108.7	70.42	153.8	129.9
40	5.3	13.8	208.3	188.7	113.6	72.46	163.9	137.0
41	4.8	—	227.3	208.3	—	—	178.6	151.5
42	4.4	—	250.0	227.3	—	—	192.3	161.3
43	3.9	—	277.8	256.4	—	—	208.3	172.4
44	3.5	—	312.5	285.7	—	—	227.3	185.2
45	3.1	—	357.1	322.6	—	—	250.0	200.0
46	2.65	—	416.7	377.4	—	—	277.8	217.4
47	2.25	—	500.0	444.4	—	—	312.5	238.1
48	—	—	—	—	—	—	—	—

*Nominal Value. Actual dimensions vary slightly.

TABLE 66

MULTI-LAYER COIL WINDING AND WEIGHT OF INSULATED WIRE, A.W.G.

COPPER WIRE

AWG No.	Enamelled			D.C.C.		Weight—lbs. per 1000ft.		
	Turns per square inch*	Ohms per cubic inch*	Turns per square inch layer insulated	Turns per square inch*	Ohms per cubic inch*	Enam.	D.C.C.	D.S.C.
8	57	.003 15	Paper insulated each layer. 20% allowance for waste space at ends of layers.	48	.002 65	50.55	51.15	
9	72	.004 75		59	.003 88	40.15	40.60	
10	90	.007 48		76	.006 31	31.80	32.18	
11	113	.011 83		93	.009 74	25.25	25.60	
12	141	.018 78		114	.015 19	20.05	20.40	
13	177	.029 5		140	.023 3	15.90	16.20	
14	221	.046 4		171	.035 9	12.60	12.91	
15	277	.073 4		208	.055 1	10.00	10.33	
16	348	.116 2		260	.086 9	7.930	8.210	7.955
17	437	.184 0		316	.133 1	6.275	6.540	6.315
18	548	.291 0		378	.200 8	4.980	5.235	5.015
19	681	.456 0		455	.304 8	3.955	4.220	3.990
20	852	.720 0		545	.460 5	3.135	3.373	3.173
21	1 065	1.134		650	.6920	2.490	2.685	2.520
22	1 340	1.800		865	1.162	1.970	2.168	2.006
23	1 665	2.820		1 030	1.774	1.565	1.727	1.593
24	2 100	4.488	4 mil. paper: 1 420	1 215	2.596	1.245	1.398	1.272
25	2 630	7.080	4 mil. paper: 1 750	1 420	3.822	.988	1.129	1.018
26	3 320	11.27	4 mil. paper: 2 030	1 690	5.740	.7845	.9140	.8100
27	4 145	17.75	4 mil. paper: 2 620	1 945	8.330	.6220	.7560	.6450
28	5 250	28.34	4 mil. paper: 3 250	2 250	12.15	.4940	.6075	.5140
29	6 510	44.32	4 mil. paper: 3 920	2 560	17.30	.3915	.4890	.4130
30	8 175	70.15	4 mil. paper: 4 780	2 930	25.15	.3105	.3955	.3330
31	10 200	110.4	2 mil. paper: 6 780	3 330	36.05	.2465	.3257	.2678
32	12 650	127.6	2 mil. paper: 8 250	3 720	50.76	.1960	.2700	.2170
33	16 200	279.0	2 mil. paper: 10 600	4 140	71.30	.1550	.2270	.1750
34	19 950	433.2	2 mil. paper: 12 400	4 595	99.77	.1230	.1928	.1412
35	25 000	684.5	2 mil. paper: 15 200	5 070	138.7	.0980	.1600	.1130
36	31 700	1 094	1 mil. paper: 21 500	5 550	191.6	.0776	.1361	.0920
37	39 600	1 723	1 mil. paper: 26 300	6 045	263	.0616	.1204	.0740
38	49 100	2 693	1 mil. paper: 32 000	6 510	357	.0488	.1049	.0623
39	62 600	4 332	1 mil. paper: 40 000	6 935	480	.0387	.0937	.0504
40	77 600	6 770	1 mil. paper: 48 400	7 450	650	.0307	.0838	.0429

*For exact winding with no allowance for space factor.

TABLE 67

MULTI-LAYER COIL WINDING AND WEIGHT OF INSULATED WIRE, S.W.G.

COPPER WIRE

SWG No.	Enamelled			D.C.C.		Weight—lbs. per 1000ft.		
	Turns per square inch*	Ohms per cubic inch*	Turns per square inch layer insulated	Turns per square inch*	Ohms per cubic inch*	Enam.	D.C.C.	D.S.C.
10	58.22	.002 95	Paper insulated each layer. 20% allowance for waste space at ends of layers.	49.56	.00256	47.77	50.77	
11	69.39	.004 37		59.14	.003 73	44.40	41.83	
12	85.75	.006 73		71.91	.005 65	33.04	33.71	
13	108.6	.0109		88.92	.008 93	25.89	26.50	
14	141.6	.0189		113.2	.0150	19.60	20.12	
15	175.6	.0287		141.6	.0234	15.87	16.36	
16	219.3	.0456		173.2	.0358	12.56	12.67	12.56
17	287.3	.0776		216.4	.0585	9.607	10.03	9.640
18	388.9	.1431		287.3	.1055	7.060	7.43	7.093
19	550.8	.290		384.6	.204	4.910	5.262	4.945
20	674.4	.440		452.8	.296	3.987	4.267	4.011
21	849.7	.705		541.0	.448	3.152	3.409	3.181
22	1 109	1.200		657.4	.710	2.419	2.649	2.446
23	1 513	2.23		864.9	1.26	1.779	1.918	1.807
24	1 789	3.14	4 mil. paper: 1 220	976.6	1.71	1.498	1.667	1.305
25	2 162	4.58	4 mil. paper: 1 460	1 109	2.35	1.241	1.392	1.247
26	2 663	6.95	4 mil. paper: 1 760	1 274	3.33	1.008	1.152	1.013
27	3 192	10.05	4 mil. paper: 2 080	1 436	4.51	.836	.977	.844
28	3 906	15.18	4 mil. paper: 2 500	1 624	6.28	.683	.811	.689
29	4 570	20.9	4 mil. paper: 2 870	1 798	8.23	.578	.699	.582
30	5 565	30.7	4 mil. paper: 3 430	1 989	10.98	.478	.604	.486
31	6 304	39.8	4 mil. paper: 3 840	2 144	13.45	.419	.524	.428
32	7 310	53.1	4 mil. paper: 4 360	2 314	16.83	.364	.467	.371
33	8 409	71.2	2 mil. paper: 5 680	2 500	21.15	.313	.412	.329
34	10 000	100.5	2 mil. paper: 6 670	2 714	27.3	.264	.328	.271
35	12 080	145	2 mil. paper: 7 920	3 306	39.3	.221	.317	.288
36	14 520	212	2 mil. paper: 9 360	3 624	53.1	.181	.238	.188
37	18 220	336	2 mil. paper: 11 400	4 007	73.5	.146	.207	.151
38	22 950	544	2 mil. paper: 14 100	4 436	104.5	.114	.169	.119
39	30 770	965	1 mil. paper: 20 900	4 956	155.0	.0854	.138	.0868
40	35 610	1 310	1 mil. paper: 24 000	5 256	193.5	.0726	.123	.0791
41	43 390	1 905	1 mil. paper: 28 800			.0608		.0677
42	51 620	2 740	1 mil. paper: 33 700			.0505		.0571
43	65 740	4 300	1 mil. paper: 41 800			.0408		.0473
44	81 620	6 760	1 mil. paper: 50 800			.0324		.0386
45	104 300	11 250				.0249		.0309
46	142 100	21 000				.0182		.0231
47	197 100	41 700				.0126		.0172
48								

*For exact winding with no allowance for space factor.