



APPENDIX
Technical Data

Wire Gauges

Gauge System		Diameter		Cross-sectional area			Weight of copper	Weight of aluminium
A.W.G	S.W.G	mm	mil	mm ²	sq.mil	cm	kg/km	kg/km
6/0	•	14.732	580	170.5	264200	336400	1515	460.2
5/0	•	13.119	516.5	135.2	209500	266800	1202	365.0
•	7/0	12.700	500	126.7	196400	250000	1126	342.0
•	6/0	11.786	464	109.1	169100	215300	969.6	294.6
4/0	•	11.684	460	107.2	166200	211600	953.2	289.5
•	5/0	10.973	432	94.56	146600	186600	840.6	255.3
3/0	•	10.404	409.6	85.01	131800	167800	755.8	229.5
•	4/0	10.160	400	81.07	125700	160000	720.7	218.9
•	3/0	9.449	372	70.12	108700	138400	623.4	189.3
2/0	•	9.266	364.8	67.43	104500	133100	599.5	182.1
•	2/0	8.839	348	61.36	95110	121100	545.5	165.7
0	•	8.252	324.9	53.49	82910	105600	475.5	144.4
•	0	8.230	324	53.19	82450	105000	472.9	143.6
•	1	7.620	300	45.60	70690	90000	405.4	123.1
1	•	7.348	289.3	42.41	65730	83690	377.0	114.5
•	2	7.011	276	38.60	59830	76180	343.2	104.2
2	•	6.544	257.6	33.63	52120	66370	299.0	90.80
•	3	6.401	252	32.18	49880	63500	286.1	86.88
•	4	5.893	232	27.27	42270	53820	242.4	73.63
3	•	5.827	229.4	26.66	41330	52620	237.0	71.99
•	5	5.385	212	22.77	35300	44940	202.4	61.49
4	•	5.189	204.3	21.15	32780	41730	188.0	57.10
•	6	4.877	192	18.68	28950	36860	166.1	50.43
5	•	4.621	181.9	16.77	26000	33100	149.1	45.28
•	7	4.470	176	15.69	24320	30970	139.5	42.37
6	•	4.115	162	13.30	20620	26250	118.3	35.92
•	8	4.064	160	12.97	20110	25600	115.3	35.02
7	•	3.665	144.3	10.55	16350	20820	93.78	28.48
•	9	3.658	144	10.51	16290	20740	93.41	28.37
8	•	3.264	128.5	8.367	12970	16510	74.39	22.59
•	10	3.251	128	8.302	12870	16380	73.80	22.42
•	11	2.946	116	6.818	10570	13460	60.61	18.41
9	•	2.906	114.4	6.633	10280	13090	58.96	17.91

Wire Gauges *Continued*

Gauge System		Diameter		Cross-sectional area			Weight of copper	Weight of aluminium
A.W.G	S.W.G	mm	mil	mm ²	sq.mil	cm	kg/km	kg/km
•	12	2.642	104	5.481	8495	10820	48.72	14.80
10	•	2.588	101.9	5.261	8155	10380	46.77	14.21
•	13	2.337	92	4.289	6648	8465	38.13	11.58
11	•	2.305	90.74	4.172	6467	8234	37.09	11.26
12	•	2.053	80.81	3.309	5129	6531	29.42	8.935
•	14	2.032	80	3.243	5027	6400	28.83	8.756
•	15	1.829	72	2.627	4072	5185	23.35	7.093
13	•	1.828	71.96	2.624	4067	5178	23.33	7.085
14	•	1.628	64.08	2.081	3225	4107	18.5	5.618
•	16	1.626	64	2.075	3217	4096	18.45	5.604
15	•	1.450	57.07	1.650	2558	3257	14.67	4.456
•	17	1.422	56	1.589	2463	3136	14.13	4.29
16	•	1.291	50.82	1.309	2029	2583	11.63	3.534
•	18	1.219	48	1.167	1810	2304	10.38	3.152
17	•	1.150	45.26	1.0380	1609	2048	9.226	2.802
18	•	1.024	40.3	0.8227	1275	1624	7.314	2.221
•	19	1.016	40	0.8107	1257	1600	7.207	2.189
•	20	0.9144	36	0.6567	1018	1296	5.838	1.773
19	•	0.9117	35.89	0.6529	1012	1288	5.804	1.763
•	21	0.8128	32	0.5189	804.2	1024	4.613	1.401
20	•	0.8116	31.95	0.5174	801.9	1021	4.600	1.397
21	•	0.7230	28.46	0.4105	636.3	810.1	3.649	1.108
•	22	0.7112	28	0.3973	615.8	784.0	3.532	1.073
22	•	0.6439	25.35	0.3256	504.7	642.6	2.895	0.8792
•	23	0.6096	24	0.2919	452.4	576.0	2.595	0.7880
23	•	0.5733	22.57	0.2581	400.1	509.4	2.295	0.6970
•	24	0.5588	22	0.2452	380.1	484.0	2.180	0.6622
24	•	0.5106	20.1	0.2047	317.3	404.0	1.82	0.5528
•	25	0.5080	20	0.2027	314.2	400.0	1.802	0.5472
•	26	0.4572	18	0.1642	254.5	324.0	1.460	0.4433
25	•	0.4546	17.9	0.1623	251.6	320.4	1.443	0.4383
•	27	0.4166	16.4	0.1363	211.3	269.0	1.212	0.3680
26	•	0.4049	15.94	0.1288	199.6	254.1	1.145	0.3477
•	28	0.3759	14.8	0.1110	172.0	219.0	0.9867	0.2997

Wire Gauges *Continued*

Gauge System		Diameter		Cross-sectional area			Weight of copper	Weight of aluminium
A.W.G	S.W.G	mm	mil	mm ²	sq.mil	cm	kg/km	kg/km
27	•	0.3606	14.2	0.1021	158.3	201.5	0.9077	0.2757
•	29	0.3454	13.6	0.09372	145.3	185.0	0.8332	0.253
28	•	0.3211	12.64	0.08097	125.5	159.8	0.7198	0.2186
•	30	0.3150	12.4	0.7791	120.8	153.8	0.6926	0.2104
•	31	0.2947	11.6	0.06819	105.7	134.6	0.6062	0.1841
29	•	0.2860	11.26	0.06422	99.54	126.7	0.5709	0.1734
•	32	0.2743	10.8	0.05908	91.58	116.6	0.5252	0.1595
30	•	0.2548	10.03	0.05097	79.01	100.6	0.4531	0.1376
•	33	0.2540	10	0.05067	78.54	100.0	0.4505	0.1368
•	34	0.2337	9.2	0.04289	66.48	84.64	0.3813	0.1158
31	•	0.2268	8.928	0.04039	62.60	79.71	0.359	0.1090
•	35	0.2134	8.4	0.03575	55.42	70.56	0.3178	0.09653
32	•	0.2019	7.95	0.03203	49.64	63.2	0.2847	0.08647
•	36	0.1930	7.6	0.02927	45.36	57.76	0.2602	0.07902
33	•	0.1798	7.08	0.02540	39.37	50.13	0.2258	0.06858
•	37	0.1727	6.8	0.02343	36.32	46.24	0.2083	0.06326
34	•	0.1602	6.305	0.02014	31.22	39.75	0.1791	0.05439
•	38	0.1524	6	0.01824	28.27	36.00	0.1622	0.04925
35	•	0.1426	5.615	0.01597	24.76	31.53	0.1420	0.04313
•	39	0.1321	5.2	0.01370	21.24	27.04	0.1218	0.03700
36	•	0.1270	5	0.01267	19.63	25.00	0.1126	0.03420
•	40	0.1219	4.8	0.01167	18.10	23.04	0.1038	0.03152
37	•	0.1131	4.453	0.01005	15.57	19.83	0.08931	0.02713
•	41	0.1118	4.4	0.0981	15.21	19.36	0.08721	0.02649
•	42	0.1016	4	0.008107	12.57	16.00	0.07207	0.02189
38	•	0.1007	3.965	0.007968	12.35	15.72	0.07084	0.02151
•	43	0.09140	3.6	0.006567	10.18	12.96	0.05838	0.01773
39	•	0.08970	3.531	0.006319	9.794	12.47	0.05618	0.01706
•	44	0.08128	3.2	0.005189	8.042	10.24	0.04613	0.01401
40	•	0.07988	3.145	0.005012	7.768	9.891	0.04456	0.01353
41	45	0.07113	2.8	0.003973	6.159	7.842	0.03532	0.01073
42	•	0.06334	2.494	0.003151	4.884	6.219	0.02801	0.008508
•	46	0.06096	2.4	0.002919	4.524	5.760	0.02595	0.007880
43	•	0.05641	2.221	0.002499	3.873	4.932	0.02222	0.006747
•	47	0.05080	2	0.002027	3.142	4.000	0.01802	0.005472
44	•	0.05023	1.978	0.001982	3.072	3.911	0.01762	0.005351
45	•	0.04474	1.761	0.001572	2.436	3.102	0.01397	0.004244
•	48	0.04064	1.6	0.001297	2.011	2.56	0.01153	0.003502
46	•	0.03984	1.568	0.001246	1.932	2.46	0.01108	0.003365
47	•	0.03548	1.397	0.0009884	1.532	1.951	0.008787	0.002669
48	•	0.03159	1.244	0.0007838	1.215	1.547	0.006968	0.002116
•	49	0.03048	1.2	0.0007297	1.131	1.440	0.006487	0.001970
49	•	0.02813	1.108	0.0006216	0.9635	1.227	0.005526	0.001678
•	50	0.02540	1	0.0005067	0.7854	1.000	0.004505	0.001368
50	•	0.02505	0.9863	0.0004929	0.7641	0.9728	0.004382	0.001331

Stranded Annealed Copper and Aluminium Conductors

Nominal cross-sectional area	Minimum number of wires in the conductor						Maximum resistance of conductor at 20°C		
	Circular conductor		Circular compacted conductor		Shaped conductor		Annealed copper conductor		Plain aluminium conductor
	Cu	Al	Cu	Al	Cu	Al	Plain wires	Metal-coated wires	
mm ²							ohm/km	ohm/km	ohm/km
1.5	7	•	6	•	•	•	12.10	12.20	•
2.5	7	•	6	•	•	•	7.41	7.56	•
4	7	7	6	•	•	•	4.61	4.70	7.41
6	7	7	6	•	•	•	3.08	3.11	4.61
10	7	7	6	•	•	•	1.83	1.84	3.08
16	7	7	6	6	•	•	1.15	1.16	1.91
25	7	7	6	6	6	6	0.727	0.734	1.20
35	7	7	6	6	6	6	0.524	0.529	0.868
50	19	19	6	6	6	6	0.387	0.391	0.641
70	19	19	12	12	12	12	0.268	0.270	0.443
95	19	19	15	15	15	15	0.193	0.195	0.320
120	37	37	18	15	18	15	0.153	0.154	0.253
150	37	37	18	15	18	15	0.124	0.126	0.206
185	37	37	30	30	30	30	0.0991	0.100	0.164
240	61	61	34	30	34	30	0.0754	0.0762	0.125
300	61	61	34	30	34	30	0.0601	0.0607	0.100
400	61	61	53	53	53	53	0.0470	0.0475	0.0778
500	61	61	53	53	53	53	0.0366	0.0369	0.0605
630	91	91	53	53	53	53	0.0283	0.0286	0.0469
800	91	91	53	53	•	•	0.0221	0.0224	0.0367
1000	91	91	53	53	•	•	0.0176	0.0177	0.0291

Formula for Electrical Calculation

To calculate	Given	D.C	A.C. single phase	A.C. 3 phase
Current (A)	kW	$A = \frac{1000 \times kW}{V}$	$A = \frac{1000 \times kW}{V \times pf}$	$A = \frac{1000 \times kW}{1.73 \times V \times pf}$
Current (A)	kVA	•	$A = \frac{1000 \times kVA}{V}$	$A = \frac{1000 \times kVA}{1.73 \times V}$
Current (A)	hp	$A = \frac{746 \times hp}{V \times eff}$	$A = \frac{746 \times hp}{v \times eff \times pf}$	$A = \frac{746 \times hp}{1.73 \times V \times eff \times pf}$
Power (kW)	VA	$A = \frac{A \times V}{1000}$	$kW = \frac{A \times V \times pf}{1000}$	$kW = \frac{1.73 \times A \times V \times pf}{1000}$
Apparent Power (kVA)	VA	•	$kVA = \frac{A \times V}{1000}$	$kVA = \frac{1.73 \times A \times V}{1000}$

pf = Power factor of equipment or system under consideration

eff = Efficiency of motor or machinery

V = Line voltage

Temperature Correction Factors for Conductor Resistance

Temperature of conductor at time of measurement, °C	Factor to convert to 20 °C	Reciprocal to convert from 20 °C
5	1.064	0.940
6	1.059	0.944
7	1.055	0.948
8	1.050	0.952
9	1.046	0.956
10	1.042	0.960
11	1.037	0.964
12	1.033	0.968
13	1.029	0.972
14	1.025	0.976
15	1.020	0.980
16	1.016	0.984
17	1.012	0.988
18	1.008	0.992
19	1.004	0.996
20	1.000	1.000
21	0.996	1.004
22	0.992	1.008
23	0.988	1.012
24	0.984	1.016
25	0.980	1.020
26	0.977	1.024
27	0.973	1.028
28	0.969	1.032
29	0.965	1.036
30	0.962	1.040
35	0.943	1.060
40	0.926	1.080
45	0.909	1.100
50	0.893	1.120
55	0.877	1.140
60	0.862	1.160
65	0.847	1.180
70	0.833	1.200
75	0.820	1.220
80	0.806	1.240
85	0.794	1.260
90	0.781	1.280

Minimum Installation Radius

Type of conductor and cable	Overall Diameter , D	Maximum internal radius of bend
Circular copper conductor non - armoured	Up to 10mm	3 D
	Above 10mm and Up to 25mm	4 D
	Above 25mm	6 D
Circular copper conductor armoured	Any	6 D
Solid aluminium or shaped copper conductors, armoured or unarmoured	Any	8 D

Note : Wherever possible, larger installation radius should be used

Common Conversion Factors

Equivalent		Reciprocal		
Mass				
1 cwt	=	50.802	kg	0.0197
1 oz	=	28.349	gm	0.0352
1 lb	=	0.4536	kg	2.2046
1 lb	=	0.00454	tonne (metric)	220.26
1 Ton (long)	=	1.016	tonne (metric)	0.09842
Length				
1 in	=	25.4	mm	0.03937
1 ft	=	0.3048	mm	3.2808
1 yd	=	0.9144	mm	1.0936
1 mile	=	1.6093	km	0.6214
Area				
1 in ²	=	645.16	mm ²	0.00155
1 ft ²	=	0.0929	m ²	10.7642
1 yd ²	=	0.8361	m ²	1.196
Volume				
1 in ³	=	16.387	cm ³ (ml or cc)	0.061
1 ft ³	=	0.0283	m ³	35.3335
1 ft ³	=	6.229	gal (Imp)	0.1605
1 ft ³	=	28.328	l	0.0353
1 yd ³	=	0.7645	m ³	1.3079
1 gal (USA)	=	0.8327	gal (Imp)	1.2009
Force				
1 lbf	=	0.4535	kgf	2.2046
1 kgf	=	9.8065	N	0.1019
1 ton (long)f	=	9.964	kN	0.10036
Pressure and Stress				
1 atm	=	0.1013	Mpa	9.869
1 atm	=	1.0133	bar	0.9689
1 lbf/in ² (psi)	=	6.894	kN/mm ² (kPa)	0.145
1 bar	=	1.0197	kgf/cm ²	0.09806
Energy (Work and Heat)				
1 HP.h	=	2544.5	Btu	0.00393
1 Btu	=	0.00023	kW.h	3413
1 Btu	=	1.0551	kJ	0.9478
1 Btu	=	107.59	kgf.m	0.00929
1 cal	=	4.187	J	0.239

1 mil = 0.001 in = 0.0254 mm

1 CM (Circular mil) = 0.7854 x 10⁻⁶in² = 0.5067 x 10³mm²

°C	°F	°C	°F	°C	°F
-30	-22	39	102.2	81	177.8
-20	-4	40	104	82	179.6
-10	14	41	105.8	83	181.4
0	32	42	107.6	84	183.2
1	33.8	43	109.4	85	185
2	35.6	44	111.2	86	186.8
3	37.4	45	113	87	188.6
4	39.4	46	114.8	88	190.4
5	41	47	116.6	89	192.2
6	42.8	48	118.0	90	194
7	44.6	49	120.2	91	195.8
8	46.4	50	122	92	197.6
9	48.9	51	123.8	93	199.4
10	50	52	125.6	94	201.2
11	51.8	53	127.4	95	203
12	53.6	54	129.2	96	204.8
13	55.4	55	131	97	206.6
14	57.2	56	132.8	98	208.4
15	59	57	134.6	99	210.2
16	60.8	58	136.4	100	212
17	62.6	59	138.2	120	248
18	64.4	60	140	140	284
19	66.2	61	141.8	160	320
20	68	62	143.6	180	356
21	69.8	63	145.4	200	392
22	71.6	64	147.2	212	413
23	73.4	65	149	220	428
24	75.2	66	150.8	240	464
25	77	67	152.6	260	500
26	78.8	68	154.4	280	536
27	80.6	69	156.2	300	572
28	82.4	70	158	320	608
29	84.2	71	159.8	340	644
30	86	72	161.6	360	689
31	87.8	73	163.4	380	716
32	89.6	74	165.2	400	752
33	91.4	75	167	420	788
34	93.2	76	168.8	440	824
35	95	77	170.6	460	860
36	96.8	78	172.4	480	896
37	98.6	79	174.2	500	932
38	11.4	80	176	600	1,112

°C	°F	°C	°F	°C	°F
-30	-34.4	39	3.89	81	27.2
-20	-28.9	40	4.44	82	27.8
-10	-23.3	41	5	83	28.3
0	-17.8	42	5.56	84	28.9
1	-17.2	43	6.11	85	29.4
2	-16.7	44	6.67	86	30
3	-16.1	45	7.22	87	30.6
4	-15.6	46	7.78	88	31.1
5	-15.0	47	8.33	89	31.7
6	-14.4	48	8.89	90	32.2
7	-13.9	49	9.44	91	32.8
8	-13.3	50	10.0	92	33.3
9	-12.8	51	10.6	93	33.9
10	-12.2	52	11.1	94	34.4
11	-11.7	53	11.7	95	35
12	-11.1	54	12.2	96	35.6
13	-10.6	55	12.8	97	36.1
14	-10.0	56	13.3	98	36.7
15	-9.44	57	13.9	99	37.2
16	-8.89	58	14.4	100	37.8
17	-8.33	59	15.0	120	49
18	-7.78	60	15.6	140	60
19	-7.22	61	16.1	160	71
20	-6.67	62	16.7	180	82
21	-6.11	63	17.2	200	93
22	-5.56	64	17.8	212	100
23	-5.00	65	18.3	220	104
24	-4.44	66	18.9	240	116
25	-3.89	67	19.4	260	127
26	-3.33	68	20.0	280	138
27	-2.78	69	20.6	300	149
28	-2.22	70	21.1	320	160
29	-1.67	71	21.7	340	171
30	-1.11	72	22.2	360	182
31	-0.56	73	22.8	380	193
32	0	74	23.3	400	204
33	0.56	75	23.9	420	216
34	1.11	76	24.4	440	227
35	1.67	77	25.0	460	238
36	2.22	78	25.6	480	249
37	2.78	79	26.1	500	260
38	3.33	80	26.7	600	316

Formula :

$$°F = \frac{9}{5} °C + 32$$

Formula :

$$°C = \frac{5}{9} (°F - 32)$$

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SALES OFFICES

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