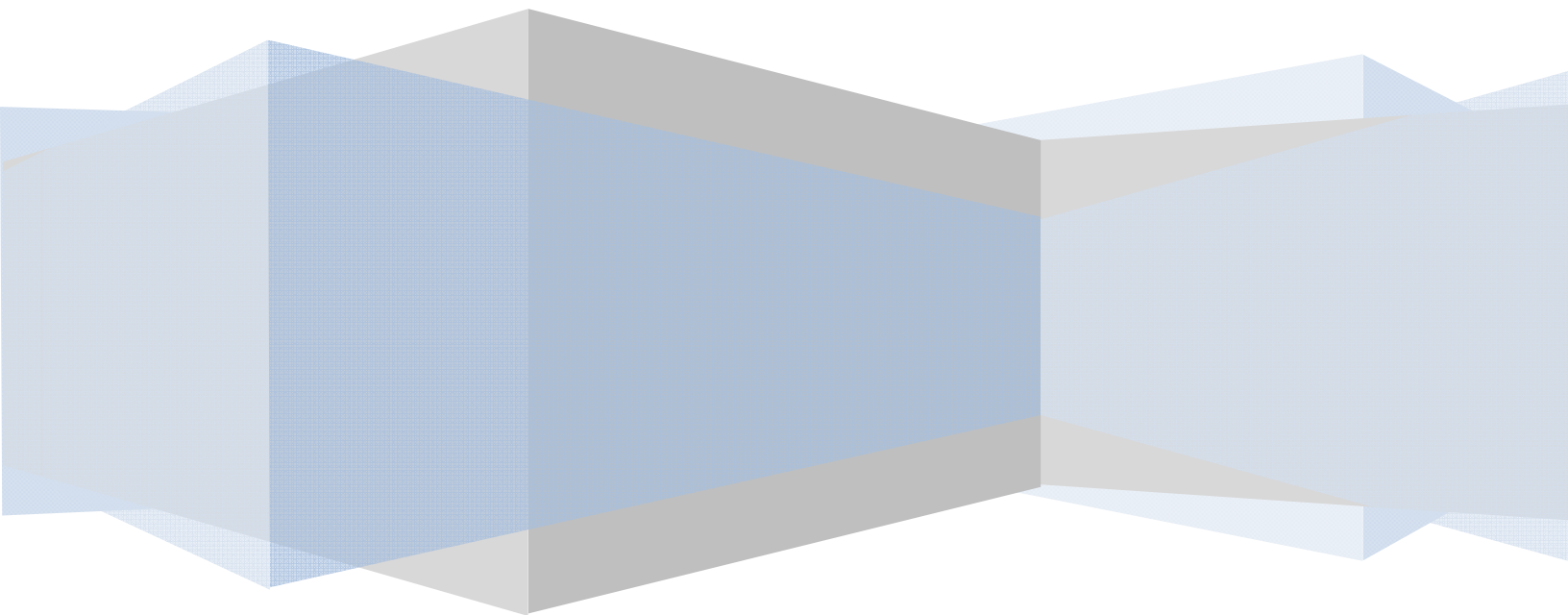


GEEKAY WINDING WIRE LTD



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- Properties of Copper and Aluminium
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PROPERTIES OF COPPER AND ALUMINIUM

	COPPER	ALUMINIUM
GENERAL PROPERTIES		
Symbol	Cu	Al
Appearance	RED-ORANGE METALLIC LUSTER	SILVER-GREY METALLIC
PHYSICAL PROPERTIES		
Phase	SOLID	SOLID
Boiling point	2562 C / 2835 K / 4643 F	2470 C / 2743 K / 4478 F
Melting point	1084.62 C / 1357.77 K / 1984.32 F	C / 2835 K / 4643 F
Density(RT)	8.96G/cm ³	2.7G/cm ³
Heat of fusion	13.26 KJ/mol	10.71 KJ/mol
Heat of vaporisation	300.4 KJ/mol	284 KJ/mol
ELECTRICAL PROPERTIES		
Temperature coefficient of resistance	$3.86 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$	$4.29 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$
Electrical resistivity	$2.65 \times 10^{-8} \text{ } \Omega\text{m}$	$1.72 \times 10^{-8} \text{ } \Omega\text{m}$
Thermal conductivity	$5.95 \times 10^7 \text{ } (\Omega\text{m})^{-1}$	$3.77 \times 10^7 \text{ } (\Omega\text{m})^{-1}$

AWG/SWG CONVERSION TABLE

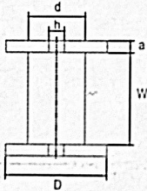
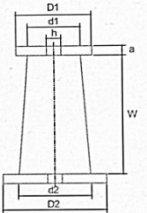
GAUGE NO	AWG		SWG		GAUGE NO	AWG		SWG	
	INCHES	MM	INCHES	MM		INCHES	MM	INCHES	MM
0	0.3249	8.25	0.324	8.23	23	0.0226	0.574	0.024	0.610
1	0.2893	7.35	0.300	7.62	24	0.0201	0.511	0.022	0.559
2	0.2576	6.54	0.276	7.01	25	0.0179	0.455	.020	0.508
3	0.2294	5.83	0.252	6.40	26	0.0159	0.404	0.0180	0.457
4	0.2043	5.19	0.232	5.89	27	0.0142	0.61	0.0164	0.417
5	0.1819	4.62	0.212	5.38	28	0.0126	0.320	0.0148	0.376
6	0.162	4.11	0.192	4.88	29	0.0113	0.287	0.0136	0.345
7	0.1443	3.67	0.176	4.47	30	0.0100	0.254	0.0124	0.315
8	0.1285	3.26	0.160	4.06	31	0.00889	0.226	0.0116	0.295
9	0.1144	2.91	0.144	3.66	32	0.0080	0.203	0.0108	0.274
10	0.1019	2.59	0.128	3.25	33	0.0071	0.180	0.0100	0.254
11	0.0907	2.3	0.116	2.95	34	0.0063	0.160	0.0092	0.234
12	0.0808	2.05	0.104	2.64	35	0.0056	0.142	0.0084	0.213
13	0.0720	1.83	0.092	2.34	36	0.0050	0.127	0.0076	0.193
14	0.0641	1.63	0.080	2.03	37	0.0045	0.114	0.0068	0.173
15	0.0571	1.45	0.072	1.83	38	0.0040	0.102	0.0060	0.152
16	0.0508	1.29	0.064	1.63	39	0.0035	0.089	0.0052	0.132
17	0.0453	1.15	0.056	1.42	40	0.0031	0.079	0.0048	0.122
18	0.0403	1.02	0.048	1.22	41	0.0028	0.071	0.0044	0.112
19	0.0359	0.912	0.040	1.02	42	0.0025	0.064	0.0040	0.102
20	0.032	0.813	0.036	0.914	43	0.0022	0.056	0.0036	0.091
21	0.0285	0.724	0.032	0.813	44	0.0020	0.051	0.0032	0.081
22	0.0253	0.643	0.028	0.711	45	0.0018	0.046	0.0028	0.071

**DIAMETER AND INCREASE IN DIAMETER OF ENAMELED ROUND WINDING WIRE
(BASIS: IS 13730-01 IEC 60317-0-1)**

NOMINAL CONDUCTOR DIAMETER		CONDUCTOR TOLERANCE (+/-) (MM)	GRADE 1		GRADE 2		GRADE 3	
			MIN. INCREASE (MM)	MAX OVERALL DIA(MM)	MIN. INCREASE (MM)	MAX OVERALL DIA(MM)	MIN. INCREASE (MM)	MAX OVERALL DIA(MM)
SWG	(MM)							
8	4.064	0.041	0.047	4.155	0.092	4.201	0.138	4.245
9	3.658	0.037	0.047	3.746	0.089	3.791	0.134	3.824
10	3.251	0.033	0.046	3.336	0.086	3.380	0.130	3.422
11	2.946	0.030	0.045	3.029	0.084	3.072	0.127	3.112
12	2.642	0.027	0.043	2.722	0.08	2.764	0.123	2.803
13	2.337	0.024	0.042	2.415	0.079	2.455	0.119	2.493
14	2.032	0.020	0.041	2.108	0.077	2.147	0.116	2.184
15	1.829	0.019	0.040	1.903	0.075	1.941	0.113	1.977
16	1.626	0.017	0.039	1.698	0.073	1.735	0.110	1.770
17	1.422	0.015	0.038	1.492	0.071	1.528	0.107	1.562
18	1.219	0.013	0.035	1.285	0.067	1.318	0.100	1.350
19	1.016	0.011	0.034	1.080	0.065	1.113	0.098	1.144
20	0.914	0.010	0.034	0.976	0.063	1.008	0.095	1.038
21	0.813	0.009	0.032	0.872	0.060	0.902	0.090	0.931
22	0.711	0.008	0.03	0.766	0.056	0.795	0.085	0.822
23	0.61	0.006	0.027	0.659	0.050	0.684	0.075	0.708
24	0.559	0.006	0.025	0.605	0.047	0.629	0.071	0.652
25	0.508	0.006	0.025	0.554	0.047	0.578	0.071	0.602
26	0.457	0.005	0.024	0.501	0.045	0.523	0.067	0.544
27	0.417	0.005	0.022	0.458	0.042	0.48	0.064	0.500
28	0.376	0.005	0.021	0.417	0.040	0.435	0.060	0.454
29	0.345	0.005	0.02	0.382	0.038	0.401	0.057	0.418
30	0.315	0.004	0.019	0.349	0.035	0.367	0.053	0.384
31	0.295	0.004	0.019	0.329	0.035	0.347	0.053	0.364
32	0.274	0.004	0.018	0.306	0.033	0.323	0.050	0.339
33	0.254	0.004	0.018	0.286	0.033	0.303	0.050	0.319
34	0.234	0.004	0.017	0.265	0.032	0.281	0.048	0.296
35	0.213	0.003	0.015	0.241	0.029	0.255	0.043	0.269
36	0.193	0.003	0.014	0.219	0.027	0.232	0.039	0.245
37	0.173	0.003	0.013	0.197	0.025	0.210	0.036	0.222
38	0.152	0.003	0.012	0.174	0.023	0.186	0.033	0.197
39	0.132	0.003	0.011	0.152	0.021	0.162	0.030	0.171

40	0.122	0.003	0.010	0.141	0.019	0.151	0.028	0.160
41	0.112	0.003	0.009	0.130	0.017	0.139	0.026	0.147
42	0.102	0.003	0.009	0.119	0.017	0.128	0.026	0.136
43	0.091	0.003	0.008	0.107	0.016	0.115	0.023	0.122
44	0.081	0.003	0.008	0.096	0.015	0.103	0.022	0.110
45	0.071	0.003	0.007	0.084	0.012	0.091	0.018	0.097
46	0.061			0.074		0.081		
47	0.051			0.062		0.068		
48	0.041			0.050		0.056		

SPOOL DIMENSIONS FOR ENAMELED WIRES

TYPE	BOBBIN	FLANGE DIA	BARREL DIA	INSIDE WIDTH	FLANGE THICKN -ESS	HOLE DIA	STANDARD WEIGHT OF ENAMELED COPPER WIRE PER SPOOL	STANDARD WEIGHT OF ENAMELED ALUMINIUM WIRE PER SPOOL
		D(mm)	d(mm)	W(mm)	a(mm)	h(mm)	Kg	Kg
 CYLINDRICAL PLASTIC SPOOL	GK25	265	155	165	15	45	25	7.5
	DIN160	160	100	128	16	22	6.3	2
	DIN200	200	125	200	20	22	14	4.2
	DIN250	250	160	200	20	22	22	6.6
 PLASTIC TAPER SPOOL	PT-4	D1 124 D2 140	d1 74 d2 86	170	15	26	4	3
	PT-10	D1 160 D2 180	d1 96 d2 110	200	15	30	10	4.5
	PT-15	D1 180 D2 200	d1 96 d2 110	198	15	30	15	7.5
	PT-25	D1 215 D2 230	d1 110 d2 130	250	15	34	25	12
	PT-60	D1 270 D2 300	d1 150 d2 180	350	25	45	60	27.2
	PT-45	D1 236 D2 250	d1 140 d2 160	335	32	100	40	18.2
	PT-100	D1 300 D2 315	d1 180 d2 200	425	38	100	90	57.5
	PT-200	D1 375 D2 315	d1 224 d2 250	530	50	100	190	12
	PT-400	D1 475 D2 500	d1 280 d2 315	670	65	100	400	

FINE WIRE DRAWING METER-WEIGHT RELATION CHART

SIZE		LENGTH- METERS		
GAUGE	MM	FOR WEIGHT: 80 KG	FOR WEIGHT: 80 KG	FOR WEIGHT: 40/20KG FOR(43-45)
45	0.071			5578555
44	0.081			428616
43	0.091			339590
42	0.102			270295
41	0.112			224183
40	0.122			188938
39	0.132			161395
38	0.152	389494	243434	194747
37	0.173	300674	187921	150337
36	0.193	241587	150992	120794
35	0.213	198349	123968	99174
34	0.234	164345	102716	82173
33	0.254	139483	87177	69741
32	0.274	119864	74915	59932
31	0.295	103406	64629	51703
30	0.315	90692	56682	45346
29	0.345	75605	47253	37802
28	0.376	63652	39783	31826
27	0.417	51751	32344	25875
26	0.452	43088	26930	21544
25	0.508	34871	21794	17435
24	0.559	28798	17999	14399
23	0.610	24184	15115	12092
22	0.711	17801	11126	8901
21	0.813	13165	8509	6807
20	0.914	10772	6732	5386

SIZE(mm)-RESISTANCE- WEIGHT OF THE CONDUCTOR

Bare Conductor Dia			Ohms per metre		Wt (kg) per 1000m for Cu	Wt (kg) per 1000m for Al
Size in mm	Wire Size					
Nominal	Min.	Max.	Max.	Min.		
mm	mm	mm				
1.600	1.584	1.616	0.0087	0.0083	17.88	5.43
1.400	1.386	1.414	0.0114	0.011	13.69	4.16
1.250	1.237	1.263	0.0143	0.0135	10.91	3.31
1.120	1.109	1.131	0.0178	0.0168	8.76	2.66
1.000	0.990	1.010	0.0224	0.2115	6.99	2.12
0.900	0.891	0.909	0.0276	0.2612	5.66	1.72
0.800	0.792	0.808	0.0350	0.33	4.47	1.36
0.710	0.703	0.717	0.0444	0.419	3.52	1.07
0.630	0.624	0.636	0.0563	0.530	2.77	0.84
0.560	0.554	0.566	0.0715	0.0673	2.19	0.67
0.500	0.495	0.505	0.0896	0.0846	1.75	0.53
0.450	0.445	0.455	0.1109	0.1042	1.41	0.43
0.400	0.395	0.405	0.1407	0.1315	1.12	0.34
0.355	0.351	0.359	0.1762	0.1674	0.88	0.27
0.315	0.311	0.319	0.2270	0.2121	0.69	0.21
0.280	0.276	0.284	0.2882	0.2676	0.55	0.17
0.250	0.246	0.254	0.3628	0.3345	0.44	0.13
0.224	0.221	0.227	0.4495	0.4188	0.35	0.11
0.200	0.197	0.203	0.5657	0.5237	0.28	0.08
0.180	0.177	0.183	0.7008	0.6445	0.23	0.07
0.160	0.157	0.163	0.8907	0.8123	0.18	0.05
0.014	0.137	0.143	1.1698	1.0555	0.00	0.00
0.125	0.122	0.128	1.4751	1.3174	0.11	0.03
0.112	0.109	0.115	1.8480	1.6320	0.09	0.03

RESISTANCE OF CONDUCTOR WIRE (dia IN SWG)

Size SWG	Conductor Dia			Resistance at 20 deg.C		Wt (kg) per 1000m for Cu	Wt (kg) per 1000m for Al
	Min.	Nominal	Max.	Ohms per metre			
	mm	mm	mm	min.	Max.		
8	4.023	4.064	4.104	0.0013	0.0014	115.36	35.04
9	3.622	3.657	3.693	0.0016	0.0017	93.41	28.37
10	3.218	3.251	3.284	0.0020	0.0021	73.82	22.42
11	2.915	2.946	2.976	0.0024	0.0026	60.62	18.41
12	2.615	2.641	2.667	0.0030	0.0032	48.72	14.80
13	2.313	2.336	2.359	0.0039	0.0041	38.12	11.58
14	2.012	2.032	2.052	0.0051	0.0055	28.84	8.76
15	1.810	1.829	1.848	0.0063	0.0067	23.37	7.10
16	1.607	1.626	1.643	0.0080	0.0085	18.47	5.61
17	1.407	1.422	1.437	0.0105	0.0111	14.12	4.29
18	1.206	1.219	1.232	0.0142	0.0151	10.38	3.15
19	1.005	1.016	1.027	0.0205	0.0217	7.21	2.19
20	0.904	0.914	0.924	0.0253	0.0269	5.84	1.77
21	0.804	0.813	0.822	0.0319	0.0340	4.62	1.40
22	0.703	0.711	0.719	0.0418	0.0444	3.53	1.07
23	0.604	0.610	0.616	0.0569	0.0602	2.60	0.79
24	0.553	0.559	0.565	0.0676	0.0718	2.18	0.66
25	0.502	0.508	0.514	0.0816	0.0871	1.80	0.55
26	0.452	0.457	0.462	0.1011	0.1075	1.46	0.44
27	0.412	0.417	0.422	0.1212	0.1293	1.21	0.37
28	0.371	0.376	0.381	0.1487	0.1595	0.99	0.30
29	0.341	0.345	0.349	0.1772	0.1888	0.83	0.25
30	0.311	0.315	0.319	0.2121	0.2269	0.69	0.21
31	0.291	0.295	0.299	0.2414	0.2592	0.61	0.18
32	0.270	0.274	0.278	0.2792	0.3011	0.52	0.16
33	0.250	0.254	0.258	0.3242	0.3512	0.45	0.14
34	0.230	0.234	0.238	0.3809	0.4149	0.38	0.12
35	0.210	0.213	0.216	0.4625	0.4978	0.32	0.10
36	0.190	0.193	0.196	0.5618	0.6081	0.26	0.08
37	0.170	0.173	0.176	0.6967	0.7596	0.21	0.06
38	0.149	0.152	0.155	0.8982	0.9888	0.16	0.05
39	0.129	0.132	0.135	1.1841	1.3192	0.12	0.04
40	0.119	0.122	0.125	1.3811	1.5502	0.10	0.03
41	0.109	0.112	0.115	1.6320	1.8480	0.09	0.03
42	0.099	0.102	0.105	1.9570	2.2400	0.07	0.02

CONDUCTOR RESISTANCE OF HALF SIZES

BARE SIZE	CONDUCTOR DIA			RESISTANCE AT 20°C	
	MIN.	NOMINAL	MAX.	OHMS PER METRE	
SWG	MM	MM	MM	MIN.	MAX.
8.5	3.822	3.860	3.898	0.0014	0.0015
9.5	3.420	3.454	3.488	0.0018	0.0019
10.5	3.066	3.098	3.13	0.0022	0.0023
11.5	2.766	2.794	2.822	0.0027	0.0023
12.5	2.464	2.489	2.514	0.0034	0.0036
13.5	2.162	2.184	2.208	0.0044	0.0047
14.5	1.911	1.930	1.949	0.0057	0.0060
15.5	1.710	1.727	1.744	0.0071	0.0075
16.5	1.509	1.524	1.543	0.0091	0.0096
17.5	1.307	1.320	1.333	0.0121	0.0129
18.5	1.108	1.117	1.128	0.0170	0.0179
19.5	0.955	0.965	0.975	0.0227	0.0240
20.5	0.854	0.863	0.872	0.0283	0.0301
21.5	0.754	0.762	0.770	0.0364	0.0386
22.5	0.653	0.662	0.667	0.0485	0.0514
23.5	0.578	0.584	0.590	0.0620	0.0657
24.5	0.528	0.533	0.538	0.0745	0.0787
25.5	0.477	0.482	0.487	0.0910	0.0964
26.5	0.432	0.437	0.442	0.1104	0.1176
27.5	0.391	0.396	0.401	0.1342	0.1436
28.5	0.355	0.360	0.385	0.1456	0.1742
29.5	0.328	0.330	0.334	0.1934	0.2040
30.5	0.301	0.305	0.309	0.226	0.2423
31.5	0.280	0.284	0.288	0.2602	0.2800
32.5	0.260	0.264	0.268	0.3005	0.3248
33.5	0.240	0.244	0.248	0.3509	0.3811
34.5	0.221	0.224	0.227	0.4188	0.4495
35.5	0.200	0.203	0.208	0.4988	0.5489
36.5	0.180	0.183	0.188	0.6104	0.6776
37.5	0.150	0.162	0.165	0.7928	0.9758
38.5	0.139	0.142	0.145	1.0266	1.1364
39.5	0.124	0.127	0.130	1.2771	1.4279

DETAILS OF ENAMELING MATERIAL

CHEMICAL BASE	CHARACTRESTICS & APPLICATIONS	THERMAL INDEX
POLYSTER	Excellent workability, flexibility & pin hole free	155°C
POLYSTERIMIDE	Excellent thermo-resistance solderable (EI) low soldering temperature	180°C
THEICPOLYSTER	High cut-through temperature, excellent heat shock resistance & work ability, used for base coat	180°C
POLYURETHANE	Excellent workability & solderability, pinhole free	130°C
	For fine wire, excellent workability & solderability	155°C
MODIFIED POLYSTER	Excellent workability for horizontal and vertical & high speed machines, flexibility & pin hole free,	155°C

PRECAUTIONS FOR ENAMELED WIRE

To ensure the best performance with GEEKAY wire, please be sure to exert special care when handling. We suggest the following guidelines:

DURING INCOMING SHIPMENTS

- ✓ All incoming shipments should be checked for damage during transportation. If damaged, please contact freight carrier.
- ✓ When using a fork lift or hand cart, be careful not to bump or penetrate the outside of the cartons as this may damage the magnet wire.

DURING WIRE STORAGE

- ✓ Avoid double stacking the wire pallets.
- ✓ Store cartons on their original pallets and keep unused spools safely stored in their original cartons until needed. Store the wire carton in a dry, non corrosive location. Keep the wire protected from dust and other contaminants.
- ✓ Do not stack different sized of spools together or near each other, the spool flanges may rub against the wire and cause nicks or dents.

DURING WIRE HANDLING

- ✓ Do not stack spools outside the original GEEKAY box or carton.
- ✓ When removing spools from the carton or package, completely bend all lids and