

# ELEKTRISOLA

## Cu Copper

### General Description

Since the beginning of the electrical age, copper has been recognized for its unique and beneficial qualities in electrical applications. Copper is a malleable and ductile material with excellent conductivity. Elektrisola's electrolytic copper (Cu-ETP) is of high purity. We use copper (99.95%) which enables us to produce ultrafine wire down to a diameter of 10 microns. Copper magnet wire is available in diameters from 0.008mm to 0.500mm (AWG 60 - 24) with all insulation and self-bonding enamel types. Besides enamelled copper wire, Elektrisola also produces copper bare wire from 0.008mm to 0.500mm.

### Features

- Very high conductivity
- Good solderability
- High ductility

### Applications

- Industrial electronics
- Automotive
- Appliance
- Audio and video
- Watches
- Computers

### Electrical Characteristics (Note 1)

Symbol	Parameter	Min (Note 3)	Typ (Note 2)	Max (Note 3)	Units
$\chi$	Conductivity		58.5		S*m/mm <sup>2</sup>
$\rho$	Resistivity		0.0171		$\Omega$ *mm <sup>2</sup> /m
$\alpha$	Thermal coefficient of resistance	3900	3930	4000	10E-6/K

### Mechanical Characteristics (Note 1)

Symbol	Parameter	Min (Note 3)	Typ (Note 2)	Max (Note 3)	Units
$\sigma_T$	Tensile strength	220	270	300	N/mm <sup>2</sup>
$\sigma_{Y1\%}$	Yield strength at 1%	120	160	200	N/mm <sup>2</sup>
$\varepsilon$	Elongation	10	25	40	%

### Physical Characteristics (Note 1)

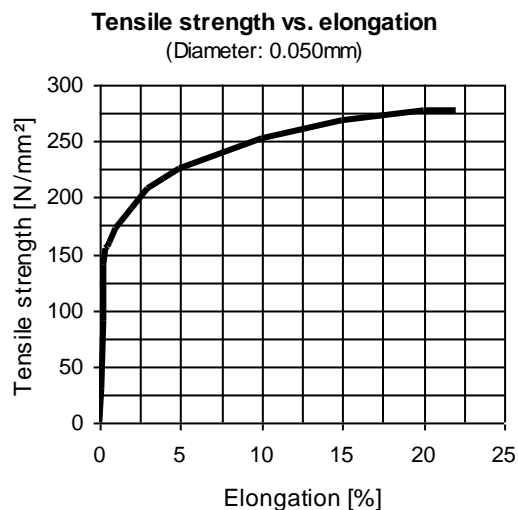
Symbol	Parameter	Min (Note 3)	Typ (Note 2)	Max (Note 3)	Units
$\rho$	Density		8.9		kg/dm <sup>3</sup>

**Note 1:** Unless otherwise specified, all limits are guaranteed for annealed and enamelled wire at  $T_A = 20^\circ\text{C}$  and measured according international standard IEC 851 as far as applicable.

**Note 2:** Typical Values represent the most likely parametric norm.

**Note 3:** All limits are evaluated by testing or statistical analysis but are not guaranteed.

## Typical Performance Characteristics



### BANNED SUBSTANCES COMPLIANCE

ELEKTRISOLA FEINDRAHT AG certifies that the products and packing materials meet the provision from the European Union for the Restriction of certain Hazardous Substances (RoHS) and the directive for Waste from Electrical and Electronic Equipment (WEEE).

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## Annex A

### Electrical Resistance

The limits of electrical resistance are derived from the calculations made in IEC standard 317-0-1 Annex C.1 "Method for the calculation of linear resistance" for copper wire.

Nom. Diameter [mm]	AWG	Min [Ω/m]	Nominal [Ω/m]	Max [Ω/m]	Nom. Diameter [mm]	AWG	Min [Ω/m]	Nominal [Ω/m]	Max [Ω/m]
0.0098	58	204.0	226.6	249.3	0.0430		10.63	11.77	12.91
0.0101		192.0	213.4	234.7	0.0437		10.29	11.40	12.50
0.0109	57	164.9	183.2	201.5	0.0440	45	10.15	11.24	12.33
0.0113		153.4	170.5	187.5	0.0450		9.705	10.75	11.79
0.0120		136.0	151.1	166.3	0.0460		9.360	10.29	11.21
0.0125	56	125.4	139.3	153.2	0.0470	44.5	8.966	9.853	10.74
0.0130	55.5	115.9	128.8	141.7	0.0480		8.596	9.447	10.30
0.0135	55	107.5	119.4	131.4	0.0490		8.249	9.065	9.881
0.0140		99.94	111.0	122.1	0.0500	44	7.922	8.706	9.489
0.0145	54.5	93.17	103.5	113.9	0.0520	43.5	7.325	8.049	8.774
0.0155	54	81.53	90.59	99.65	0.0530		7.051	7.748	8.446
0.0160		76.52	85.02	93.52	0.0550	43	6.547	7.195	7.843
0.0165	53.5	71.95	79.94	87.94	0.0560		6.316	6.940	7.565
0.0170		67.78	75.31	82.84	0.0580		5.952	6.470	6.988
0.0175	53	63.96	71.07	78.18	0.0600	42.5	5.562	6.046	6.529
0.0180		60.46	67.18	73.89	0.0620		5.209	5.662	6.115
0.0185	52.5	57.23	63.59	69.95	0.0630	42	5.045	5.484	5.922
0.0190		54.26	60.29	66.32	0.0650	41.5	4.667	5.151	5.711
0.0195	52	51.51	57.24	62.96	0.0670		4.404	4.848	5.359
0.0200		48.97	54.41	59.85	0.0680		4.281	4.707	5.196
0.0210	51.5	44.42	49.35	54.29	0.0700	41	4.050	4.442	4.890
0.0215		42.38	47.08	51.79	0.0710		3.941	4.318	4.747
0.0220	51	40.47	44.97	49.47	0.0740		3.640	3.975	4.355
0.0230	50.5	37.03	41.14	45.26	0.0750	40.5	3.547	3.869	4.235
0.0240		34.01	37.79	41.56	0.0780	40	3.289	3.577	3.903
0.0245	50	32.63	36.26	39.89	0.0800		3.133	3.401	3.703
0.0250		31.34	34.82	38.31	0.0830	39.5	2.918	3.159	3.430
0.0260	49.5	28.98	32.20	35.42	0.0850		2.787	3.012	3.265
0.0270		26.87	29.86	32.84	0.0880	39	2.606	2.811	3.038
0.0275	49	25.90	28.78	31.66	0.0900		2.495	2.687	2.900
0.0280		24.99	27.76	30.54	0.0930	38.5	2.342	2.516	2.710
0.0290	48.5	23.29	25.88	28.47	0.0950		2.247	2.412	2.594
0.0300		21.76	24.18	26.60	0.1000		2.034	2.176	2.333
0.0310	48	20.38	22.65	24.91	0.101	38.0	1.995	2.134	2.286
0.0320		19.13	21.25	23.38	0.106	37.5	1.816	1.937	2.069
0.0330	47.5	18.05	19.99	21.92	0.110		1.690	1.799	1.917
0.0340		17.00	18.83	20.65	0.112		1.632	1.735	1.848
0.0350	47	16.04	17.77	19.49	0.113	37	1.604	1.705	1.814
0.0360		15.16	16.79	18.42	0.115		1.550	1.646	1.750
0.0370	46.5	14.36	15.90	17.44	0.118	36.5	1.474	1.563	1.660
0.0380		13.61	15.07	16.53	0.120		1.426	1.511	1.604
0.0381	46.1	13.54	14.99	16.45	0.125		1.317	1.393	1.475
0.0390	46.0	12.92	14.31	15.70	0.126	36	1.297	1.371	1.451
0.0400		12.28	13.60	14.92	0.130		1.220	1.288	1.361
0.0410	45.5	11.69	12.95	14.20	0.132		1.184	1.249	1.319
0.0420		11.14	12.34	13.54	0.134	35.5	1.150	1.212	1.279

## Annex A

### Electrical Resistance (Continued)

Nom. Diameter [mm]	AWG	Min [ $\Omega/m$ ]	Nominal [ $\Omega/m$ ]	Max [ $\Omega/m$ ]
0.138		1.085	1.143	1.205
0.140		1.055	1.110	1.170
0.141	35	1.041	1.095	1.153
0.149	34.5	0.9341	0.9804	1.030
0.150		0.9219	0.9673	1.016
0.159	34.0	0.8223	0.8609	0.9021
0.160		0.8122	0.8502	0.8906
0.169	33.5	0.7295	0.7620	0.7966
0.170		0.7211	0.7531	0.7871
0.179	33	0.6515	0.6793	0.7087
0.180		0.6444	0.6718	0.7007
0.189		0.5854	0.6093	0.6345
0.190	32.5	0.5794	0.6029	0.6278
0.200		0.5237	0.5441	0.5657
0.202	32	0.5135	0.5334	0.5543
0.210		0.4757	0.4935	0.5123
0.212	31.5	0.4669	0.4843	0.5026
0.220		0.4340	0.4497	0.4662
0.222		0.4263	0.4416	0.4577
0.224		0.4188	0.4338	0.4495
0.225	31	0.4115	0.4299	0.4495
0.230		0.3941	0.4114	0.4298
0.236		0.3747	0.3908	0.4079
0.239		0.3655	0.3810	0.3975
0.240	30.5	0.3625	0.3779	0.3941
0.250		0.3345	0.3482	0.3628
0.253	30	0.3267	0.3400	0.3541
0.260		0.3096	0.3220	0.3350
0.265		0.2982	0.3099	0.3223
0.268	29.5	0.2917	0.3030	0.3150

Nom. Diameter [mm]	AWG	Min [ $\Omega/m$ ]	Nominal [ $\Omega/m$ ]	Max [ $\Omega/m$ ]
0.270		0.2874	0.2986	0.3103
0.280		0.2676	0.2776	0.2882
0.286	29	0.2566	0.2661	0.2760
0.290		0.2497	0.2588	0.2684
0.295		0.2414	0.2501	0.2592
0.300		0.2335	0.2418	0.2506
0.301	28.5	0.2320	0.2402	0.2489
0.315		0.2121	0.2193	0.2270
0.319	28	0.2068	0.2139	0.2212
0.335		0.1878	0.1939	0.2004
0.339	27.5	0.1834	0.1894	0.1956
0.345		0.1772	0.1829	0.1888
0.350		0.1722	0.1777	0.1834
0.355		0.1674	0.1727	0.1782
0.360	27	0.1620	0.1679	0.1742
0.375		0.1494	0.1548	0.1604
0.380	26.5	0.1456	0.1507	0.1561
0.383		0.1433	0.1484	0.1536
0.390		0.1383	0.1431	0.1481
0.400		0.1316	0.1360	0.1407
0.402	26	0.1303	0.1347	0.1393
0.420		0.1195	0.1234	0.1275
0.425		0.1167	0.1205	0.1244
0.427	25.5	0.1156	0.1194	0.1233
0.450		0.1042	0.1075	0.1109
0.453	25	0.1029	0.1061	0.1094
0.475		0.09366	0.09646	0.09938
0.481	24.5	0.09137	0.09407	0.09689
0.500		0.08462	0.08706	0.08959
0.508	24	0.08168	0.08434	0.08711