

Physical and Mechanical Properties

List of Properties

KANTHAL, NIKROTHAL and ALKROTHAL alloys are generally available in wire or strip form. Physical and mechanical properties of the alloys are listed in Table I and II.

(Section 'Data for KANTHAL, NIKROTHAL and ALKROTHAL', page 73, provides tables of resistance and weight data for KANTHAL, NIKROTHAL and ALKROTHAL alloys in wire and strip form, respectively.)

| Table I. KANTHAL and ALKROTHAL Alloys | KANTHAL A-1 | KANTHAL AF | KANTHAL D | ALKROTHAL |
|---|---|-----------------------------------|--------------------|--------------------|
| Form | Wire Strip | Wire Strip | Wire Strip | Wire Strip |
| Max. continuous operating temperature (element temperature in air), °C °F | 1400 ... 2550 ... | <i>1300</i> 1400* ... 2550 ... | 1300 ... 2370 ... | 1100 ... 2010 ... |
| Nominal composition, % Cr | 22 | 22 | 22 | 15 |
| Al | 5.8 | 5.3 | 4.8 | 4.3 |
| Fe | Rest | Rest | Rest | Rest |
| Density, g/cm ³ lb/in ³ | 7.10 ... 0.256 ... | 7.15 ... 0.259 ... | 7.25 ... 0.262 ... | 7.28 ... 0.263 ... |
| Electrical resistivity at 20°C, Ω mm ² m ⁻¹ at 68°F, Ω /cmf | 1.45 ... 872 ... | 1.39 ... 836 ... | 1.35 ... 812 ... | 1.25 ... 755 ... |
| Temperature factor of the resistivity, C _t | | | | |
| 800°C 1470°F | 1.03 | 1.05 | 1.06 | 1.10 |
| 1000°C 1830°F | 1.04 | 1.06 | 1.07 | 1.11 |
| 1200°C 2190°F | 1.04 | 1.06 | 1.08 | - |
| Coefficient of thermal expansion, K ⁻¹ | | | | |
| 20- 250°C 68- 480°F | | 11 · 10 ⁻⁶ | | |
| 20- 500°C 68- 930°F | | 12 · 10 ⁻⁶ | | |
| 20- 750°C 68- 1380°F | | 14 · 10 ⁻⁶ | | |
| 20- 1000°C 68- 1830°F | | 15 · 10 ⁻⁶ | | |
| Thermal conductivity at 20°C, W m ⁻¹ K ⁻¹ 68°F, Btu in ft ⁻² h ⁻¹ °F ⁻¹ | | 16 ... 111 | | |
| Specific heat capacity, kJ kg ⁻¹ K ⁻¹ , 20°C Btu lb ⁻¹ °F ⁻¹ , 68°F | | 0.46 ... 0.110 | | 0.48 ... 0.115 |
| Melting point (approx.), °C °F | | 1500 ... 2730 | | |
| Mechanical properties** (approx.) | | | | |
| Tensile strength, N mm ⁻² psi | | 750 ... 109,000 | | |
| Yield point, N mm ⁻² psi | | 550 ... 80,000 | | |
| Hardness (approx.), H _v | | 230 | | |
| Elongation at rupture (approx.), % | | 16 | | |
| Tensile strength at 900°C, N mm ⁻² at 1650°F, psi | 34 ... 5000 | 37 ... 5400 | 34 ... 5000 | 30 ... 4300 |
| Creep strength | | | | |
| at 800°C, N mm ⁻² at 1470°F, psi | 6 ... 870 | 8 ... 1160 | 6 ... 870 | 4 ... 580 |
| at 1000°C, N mm ⁻² at 1830°F, psi | 1 ... 145 | 1.5 ... 215 | 1 ... 145 | 1 ... 145 |
| Magnetic properties | Magnetic (Curie point approx. 600°C 1100°F) | | | |
| Emissivity, ε, fully oxidized condition | 0.70 | | | |

* For maximum element life above 1300°C 2370°F we recommend Kanthal A-1 due to superior oxide properties.

** The values given apply for sizes of approx. 1.0 mm diameter 0.04 in. Thinner gauges have higher strength and hardness values while the corresponding values are lower for thicker gauges.



| Table II. NIKROTHAL Alloys | NIKROTHAL 80 Plus | NIKROTHAL 60 Plus | NIKROTHAL 40 Plus | NIKROTHAL 20 Plus |
|---|-----------------------|-----------------------|-----------------------|-------------------|
| Form | Wire Strip | Wire Strip | Wire Strip | Wire |
| Max. continuous operating temperature (element temperature in air), °C °F | 1200 ... 2190 ... | 1150 ... 2100 ... | 1100 ... 2010 ... | 1050 ... 1920 ... |
| Nominal composition, % Cr | 20 | 15 | 20 | 25 |
| Fe | — | 25 | 45 | 55 |
| Ni | 80 | 60 | 35 | 20 |
| Density, g/cm ³ lb/in ³ | 8.3 ... 0.300 | 8.2 ... 0.296 | 7.9 ... 0.285 | 7.8 ... 0.282 |
| Electrical resistivity at 20°C, Ω mm ² m ⁻¹ at 68°F, Ω /cmf | 1.09 ... 655 | 1.11 ... 668 | 1.04 ... 626 | 0.95 ... 571 |
| Temperature factor of the resistivity, C _t | | | | |
| 800°C 1470°F | 1.04 | 1.10 | 1.21 | 1.28 |
| 1000°C 1830°F | 1.05 | 1.11 | 1.23 | 1.32 |
| 1200°C 2190°F | 1.07 | 1.13 | — | — |
| Coefficient of thermal expansion, K ⁻¹ | | | | |
| 20– 250°C 68– 480°F | 15 · 10 ⁻⁶ | 14 · 10 ⁻⁶ | 16 · 10 ⁻⁶ | |
| 20– 500°C 68– 930°F | 16 · 10 ⁻⁶ | 15 · 10 ⁻⁶ | 17 · 10 ⁻⁶ | |
| 20– 750°C 68– 1380°F | 17 · 10 ⁻⁶ | 16 · 10 ⁻⁶ | 18 · 10 ⁻⁶ | |
| 20– 1000°C 68– 1830°F | 18 · 10 ⁻⁶ | 17 · 10 ⁻⁶ | 19 · 10 ⁻⁶ | |
| Thermal conductivity at 20°C, W m ⁻¹ K ⁻¹ 68°F, Btu in ft ⁻² h ⁻¹ °F ⁻¹ | 15 ... 104 | 13 ... 90 | 13 ... 90 | 13 ... 90 |
| Specific heat capacity, kJ kg ⁻¹ K ⁻¹ , 20°C Btu lb ⁻¹ °F ⁻¹ , 68°F | 0.46 ... 0.110 | 0.46 ... 0.110 | 0.50 ... 0.119 | 0.50 ... 0.119 |
| Melting point (approx.), °C °F | 1400 ... 2550 | 1390 ... 2535 | 1390 ... 2535 | 1380 ... 2520 |
| Mechanical properties* (approx.) | | | | |
| Tensile strength, N mm ⁻² psi | | 750 ... 109,000 | | |
| Yield point, N mm ⁻² psi | | 450 ... 65,000 | | |
| Hardness (approx.), H _v | | 180 | | |
| Elongation at rupture (approx.), % | | 30 | | |
| Tensile strength at 900°C, N mm ⁻² at 1650°F, psi | | 100 ... 14,500 | | 120 ... 17,400 |
| Creep strength | | | | |
| at 800°C, N mm ⁻² at 1470°F, psi | | 15 ... 2160 | | 20 ... 2900 |
| at 1000°C, N mm ⁻² at 1830°F, psi | | 4 ... 580 | | 4 ... 580 |
| Magnetic properties | Non-magnetic | Slightly magnetic | Non-magnetic | |
| Emissivity, ε, fully oxidized condition | | 0.88 | | |

* The values given apply for sizes of approx. 1.0 mm diameter 0.04 in. Thinner gauges have higher strength and hardness values while the corresponding values are lower for thicker gauges.



Wire mm

A: 12.0-0.05 mm Ø
 AF: 12.0-0.10 mm Ø
 Resistivity $\Omega \text{ mm}^2 \text{ m}^{-1}$ 1.39
 Density, g cm^{-3} 7.15

$$\text{cm}^2/\Omega = \frac{l^2 C_t}{P}$$

l = Current
 C_t = Temperature factor
 P = Surface load W/cm^2

To obtain resistance at working temperature multiply by the factor C_t in the following table:

| °C | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400* |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| C_t | 1.00 | 1.00 | 1.01 | 1.01 | 1.02 | 1.03 | 1.04 | 1.04 | 1.05 | 1.05 | 1.06 | 1.06 | 1.06 | 1.06 | 1.07 |

* only AF.

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|---|------------------------------|---------------|---|--|----------------|
| 12.0 | 0.0123 | 30700 | 809 | 377 | 113 | 12.0 |
| 10.0 | 0.0177 | 17800 | 562 | 314 | 78.5 | 10.0 |
| 9.5 | 0.0196 | 15200 | 507 | 298 | 70.9 | 9.5 |
| 8.0 | 0.0277 | 9090 | 359 | 251 | 50.3 | 8.0 |
| 7.5 | 0.0315 | 7490 | 316 | 236 | 44.2 | 7.5 |
| 7.0 | 0.0361 | 6090 | 275 | 220 | 38.5 | 7.0 |
| 6.5 | 0.0419 | 4870 | 237 | 204 | 33.2 | 6.5 |
| 6.0 | 0.0492 | 3830 | 202 | 188 | 28.3 | 6.0 |
| 5.5 | 0.0585 | 2950 | 170 | 173 | 23.8 | 5.5 |
| 5.0 | 0.0708 | 2220 | 140 | 157 | 19.6 | 5.0 |
| 4.75 | 0.0784 | 1900 | 127 | 149 | 17.7 | 4.75 |
| 4.5 | 0.0874 | 1620 | 114 | 141 | 15.9 | 4.5 |
| 4.25 | 0.0980 | 1360 | 101 | 134 | 14.2 | 4.25 |
| 4.0 | 0.111 | 1140 | 89.8 | 126 | 12.6 | 4.0 |
| 3.75 | 0.126 | 936 | 79.0 | 118 | 11.0 | 3.75 |
| 3.5 | 0.144 | 761 | 68.8 | 110 | 9.62 | 3.5 |
| 3.25 | 0.168 | 609 | 59.3 | 102 | 8.30 | 3.25 |
| 3.0 | 0.197 | 479 | 50.5 | 94.2 | 7.07 | 3.0 |
| 2.8 | 0.226 | 390 | 44.0 | 88.0 | 6.16 | 2.8 |
| 2.5 | 0.283 | 277 | 35.1 | 78.5 | 4.91 | 2.5 |
| 2.25 | 0.350 | 202 | 28.4 | 70.7 | 3.98 | 2.25 |
| 2.0 | 0.442 | 142 | 22.5 | 62.8 | 3.14 | 2.0 |
| 1.9 | 0.490 | 122 | 20.3 | 59.7 | 2.84 | 1.9 |
| 1.8 | 0.546 | 104 | 18.2 | 56.5 | 2.54 | 1.8 |
| 1.7 | 0.612 | 87.2 | 16.2 | 53.4 | 2.27 | 1.7 |
| 1.6 | 0.691 | 72.7 | 14.4 | 50.3 | 2.01 | 1.6 |
| 1.5 | 0.787 | 59.9 | 12.6 | 47.1 | 1.77 | 1.5 |
| 1.4 | 0.903 | 48.7 | 11.0 | 44.0 | 1.54 | 1.4 |
| 1.3 | 1.05 | 39.0 | 9.49 | 40.8 | 1.33 | 1.3 |
| 1.2 | 1.23 | 30.7 | 8.09 | 37.7 | 1.13 | 1.2 |
| 1.1 | 1.46 | 23.6 | 6.79 | 34.6 | 0.950 | 1.1 |
| 1.0 | 1.77 | 17.8 | 5.62 | 31.4 | 0.785 | 1.0 |
| 0.95 | 1.96 | 15.2 | 5.07 | 29.8 | 0.709 | 0.95 |
| 0.9 | 2.18 | 12.9 | 4.55 | 28.3 | 0.636 | 0.9 |
| 0.85 | 2.45 | 10.9 | 4.06 | 26.7 | 0.567 | 0.85 |
| 0.8 | 2.77 | 9.09 | 3.59 | 25.1 | 0.503 | 0.8 |
| 0.75 | 3.15 | 7.49 | 3.16 | 23.6 | 0.442 | 0.75 |
| 0.7 | 3.61 | 6.09 | 2.75 | 22.0 | 0.385 | 0.7 |
| 0.65 | 4.19 | 4.87 | 2.37 | 20.4 | 0.332 | 0.65 |
| 0.6 | 4.92 | 3.83 | 2.02 | 18.8 | 0.283 | 0.6 |
| 0.55 | 5.85 | 2.95 | 1.70 | 17.3 | 0.238 | 0.55 |
| 0.5 | 7.08 | 2.22 | 1.40 | 15.7 | 0.196 | 0.5 |
| 0.475 | 7.84 | 1.90 | 1.27 | 14.9 | 0.177 | 0.475 |
| 0.45 | 8.74 | 1.62 | 1.14 | 14.1 | 0.159 | 0.45 |
| 0.425 | 9.80 | 1.36 | 1.01 | 13.4 | 0.142 | 0.425 |
| 0.4 | 11.1 | 1.14 | 0.898 | 12.6 | 0.126 | 0.4 |



Wire mm

** Minimum dimension for KANTHAL AF.

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|----------------------------------|-----------------------|---------------|-----------------------------|-----------------------------------|----------------|
| 0.375 | 12.6 | 0.936 | 0.790 | 11.8 | 0.110 | 0.375 |
| 0.35 | 14.4 | 0.761 | 0.688 | 11.0 | 0.0962 | 0.35 |
| 0.32 | 17.3 | 0.582 | 0.575 | 10.1 | 0.0804 | 0.32 |
| 0.3 | 19.7 | 0.479 | 0.505 | 9.42 | 0.0707 | 0.3 |
| 0.28 | 22.6 | 0.390 | 0.440 | 8.80 | 0.0616 | 0.28 |
| 0.26 | 26.2 | 0.312 | 0.380 | 8.17 | 0.0531 | 0.26 |
| 0.25 | 28.3 | 0.277 | 0.351 | 7.85 | 0.0491 | 0.25 |
| 0.24 | 30.7 | 0.245 | 0.323 | 7.54 | 0.0452 | 0.24 |
| 0.23 | 33.5 | 0.216 | 0.297 | 7.23 | 0.0415 | 0.23 |
| 0.22 | 36.6 | 0.189 | 0.272 | 6.91 | 0.0380 | 0.22 |
| 0.21 | 40.1 | 0.164 | 0.248 | 6.60 | 0.0346 | 0.21 |
| 0.20 | 44.2 | 0.142 | 0.225 | 6.28 | 0.0314 | 0.20 |
| 0.19 | 49.0 | 0.122 | 0.203 | 5.97 | 0.0284 | 0.19 |
| 0.18 | 54.6 | 0.104 | 0.182 | 5.65 | 0.0254 | 0.18 |
| 0.17 | 61.2 | 0.0872 | 0.162 | 5.34 | 0.0227 | 0.17 |
| 0.16 | 69.1 | 0.0727 | 0.144 | 5.03 | 0.0201 | 0.16 |
| 0.15 | 78.7 | 0.0599 | 0.126 | 4.71 | 0.0177 | 0.15 |
| 0.14 | 90.3 | 0.0487 | 0.110 | 4.40 | 0.0154 | 0.14 |
| 0.13 | 105 | 0.0390 | 0.0949 | 4.08 | 0.0133 | 0.13 |
| 0.12 | 123 | 0.0307 | 0.0809 | 3.77 | 0.0113 | 0.12 |
| 0.11 | 146 | 0.0236 | 0.0679 | 3.46 | 0.00950 | 0.11 |
| 0.10** | 177 | 0.0178 | 0.0562 | 3.14 | 0.00785 | 0.10 |
| 0.09 | 218 | 0.0129 | 0.0455 | 2.83 | 0.00636 | 0.09 |
| 0.08 | 277 | 0.00909 | 0.0359 | 2.51 | 0.00503 | 0.08 |
| 0.07 | 361 | 0.00609 | 0.0275 | 2.20 | 0.00385 | 0.07 |
| 0.06 | 492 | 0.00383 | 0.0202 | 1.88 | 0.00283 | 0.06 |
| 0.05 | 708 | 0.00222 | 0.0140 | 1.57 | 0.00196 | 0.05 |

This table is only meant for element calculations. Regarding standard stock items, please contact your local Kanthal subsidiary/representative or Kanthal Electroheat, Sweden.

Wire mm

8.0-0.02 mm Ø
 Resistivity $\Omega \text{ mm}^2 \text{ m}^{-1}$ 1.35
 Density, g cm^{-3} 7.25

$$\text{cm}^2/\Omega = \frac{I^2 C_t}{p}$$

I = Current
 C_t = Temperature factor
 p = Surface load W/cm²

To obtain resistance at working temperature multiply by the factor C_t in the following table:

| °C | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| C _t | 1.00 | 1.00 | 1.01 | 1.01 | 1.02 | 1.03 | 1.04 | 1.05 | 1.06 | 1.07 | 1.07 | 1.07 | 1.08 | 1.08 | |

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|---|------------------------------|---------------|---|--|----------------|
| 8.0 | 0.0269 | 9360 | 364 | 251 | 50.3 | 8.0 |
| 6.0 | 0.0477 | 3950 | 205 | 188 | 28.3 | 6.0 |
| 5.5 | 0.0568 | 3040 | 172 | 173 | 23.8 | 5.5 |
| 5.0 | 0.0688 | 2280 | 142 | 157 | 19.6 | 5.0 |
| 4.75 | 0.0762 | 1960 | 128 | 149 | 17.7 | 4.75 |
| 4.5 | 0.0849 | 1670 | 115 | 141 | 15.9 | 4.5 |
| 4.25 | 0.0952 | 1400 | 103 | 134 | 14.2 | 4.25 |
| 4.0 | 0.1070 | 1170 | 91.1 | 126 | 12.6 | 4.0 |
| 3.75 | 0.1220 | 964 | 80.1 | 118 | 11.0 | 3.75 |
| 3.5 | 0.1400 | 784 | 69.8 | 110 | 9.62 | 3.5 |
| 3.25 | 0.1630 | 627 | 60.1 | 102 | 8.30 | 3.25 |
| 3.0 | 0.1910 | 493 | 51.2 | 94.2 | 7.07 | 3.0 |
| 2.8 | 0.2190 | 401 | 44.6 | 88.0 | 6.16 | 2.8 |
| 2.5 | 0.275 | 286 | 35.6 | 78.5 | 4.91 | 2.5 |
| 2.25 | 0.340 | 208 | 28.8 | 70.7 | 3.98 | 2.25 |
| 2.0 | 0.430 | 146 | 22.8 | 62.8 | 3.14 | 2.0 |
| 1.8 | 0.531 | 107 | 18.4 | 56.5 | 2.54 | 1.8 |
| 1.7 | 0.595 | 89.8 | 16.5 | 53.4 | 2.27 | 1.7 |
| 1.6 | 0.671 | 74.9 | 14.6 | 50.3 | 2.01 | 1.6 |
| 1.5 | 0.764 | 61.7 | 12.8 | 47.1 | 1.77 | 1.5 |
| 1.4 | 0.877 | 50.2 | 11.2 | 44.0 | 1.54 | 1.4 |
| 1.3 | 1.02 | 40.2 | 9.6 | 40.8 | 1.33 | 1.3 |
| 1.2 | 1.19 | 31.6 | 8.2 | 37.7 | 1.13 | 1.2 |
| 1.1 | 1.42 | 24.3 | 6.9 | 34.6 | 0.950 | 1.1 |
| 1.0 | 1.72 | 18.3 | 5.7 | 31.4 | 0.785 | 1.0 |
| 0.95 | 1.90 | 15.7 | 5.1 | 29.8 | 0.709 | 0.95 |
| 0.90 | 2.12 | 13.3 | 4.6 | 28.3 | 0.636 | 0.90 |
| 0.85 | 2.38 | 11.2 | 4.1 | 26.7 | 0.567 | 0.85 |
| 0.80 | 2.69 | 9.36 | 3.64 | 25.1 | 0.503 | 0.80 |
| 0.75 | 3.06 | 7.71 | 3.20 | 23.6 | 0.442 | 0.75 |
| 0.70 | 3.51 | 6.27 | 2.79 | 22.0 | 0.385 | 0.70 |
| 0.65 | 4.07 | 5.02 | 2.41 | 20.4 | 0.332 | 0.65 |
| 0.60 | 4.77 | 3.95 | 2.05 | 18.8 | 0.283 | 0.60 |
| 0.55 | 5.68 | 3.04 | 1.72 | 17.3 | 0.238 | 0.55 |
| 0.50 | 6.88 | 2.28 | 1.42 | 15.7 | 0.196 | 0.50 |
| 0.475 | 7.62 | 1.96 | 1.28 | 14.9 | 0.177 | 0.475 |
| 0.45 | 8.49 | 1.67 | 1.15 | 14.1 | 0.159 | 0.45 |
| 0.425 | 9.52 | 1.40 | 1.03 | 13.4 | 0.142 | 0.425 |
| 0.40 | 10.7 | 1.17 | 0.911 | 12.6 | 0.126 | 0.40 |
| 0.375 | 12.2 | 0.964 | 0.801 | 11.8 | 0.110 | 0.375 |
| 0.35 | 14.0 | 0.784 | 0.698 | 11.0 | 0.0962 | 0.35 |
| 0.32 | 16.8 | 0.599 | 0.583 | 10.1 | 0.0804 | 0.325 |
| 0.30 | 19.1 | 0.493 | 0.512 | 9.42 | 0.0707 | 0.30 |
| 0.28 | 21.9 | 0.401 | 0.446 | 8.80 | 0.0616 | 0.28 |
| 0.26 | 25.4 | 0.321 | 0.385 | 8.17 | 0.0531 | 0.26 |

Wire mm

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|----------------------------------|-----------------------|---------------|-----------------------------|-----------------------------------|----------------|
| 0.25 | 27.5 | 0.286 | 0.356 | 7.85 | 0.0491 | 0.25 |
| 0.24 | 29.8 | 0.253 | 0.328 | 7.54 | 0.0452 | 0.24 |
| 0.23 | 32.5 | 0.222 | 0.301 | 7.23 | 0.0415 | 0.23 |
| 0.22 | 35.5 | 0.195 | 0.276 | 6.91 | 0.0380 | 0.22 |
| 0.21 | 39.0 | 0.169 | 0.251 | 6.60 | 0.0346 | 0.21 |
| 0.20 | 43.0 | 0.146 | 0.228 | 6.28 | 0.0314 | 0.20 |
| 0.19 | 47.6 | 0.125 | 0.206 | 5.97 | 0.0284 | 0.19 |
| 0.18 | 53.1 | 0.107 | 0.184 | 5.65 | 0.0254 | 0.18 |
| 0.17 | 59.5 | 0.0898 | 0.165 | 5.34 | 0.0227 | 0.17 |
| 0.16 | 67.1 | 0.0749 | 0.146 | 5.03 | 0.0201 | 0.16 |
| 0.15 | 76.4 | 0.0617 | 0.128 | 4.71 | 0.0177 | 0.15 |
| 0.14 | 87.7 | 0.0502 | 0.112 | 4.40 | 0.0154 | 0.14 |
| 0.13 | 102 | 0.0402 | 0.0962 | 4.08 | 0.0133 | 0.13 |
| 0.12 | 119 | 0.0316 | 0.0820 | 3.77 | 0.0113 | 0.12 |
| 0.11 | 142 | 0.0243 | 0.0689 | 3.46 | 0.0095 | 0.11 |
| 0.10 | 172 | 0.0183 | 0.0569 | 3.14 | 0.00785 | 0.10 |
| 0.090 | 212 | 0.0133 | 0.0461 | 2.83 | 0.00636 | 0.090 |
| 0.080 | 269 | 0.00936 | 0.0364 | 2.51 | 0.00503 | 0.080 |
| 0.070 | 351 | 0.00627 | 0.0279 | 2.20 | 0.00385 | 0.070 |
| 0.060 | 477 | 0.00395 | 0.0205 | 1.88 | 0.00283 | 0.060 |
| 0.050 | 688 | 0.00228 | 0.0142 | 1.57 | 0.00196 | 0.050 |
| 0.040 | 1070 | 0.00117 | 0.00911 | 1.26 | 0.00126 | 0.040 |
| 0.030 | 1910 | 0.000493 | 0.00512 | 0.942 | 0.000707 | 0.030 |
| 0.020 | 4300 | 0.000146 | 0.00228 | 0.628 | 0.000314 | 0.020 |

This table is only meant for element calculations. Regarding standard stock items, please contact your local Kanthal subsidiary/representative or Kanthal Electroheat, Sweden.

Wire mm

12.0-1.0 mm Ø
 Resistivity, $\Omega \text{ mm}^2 \text{ m}^{-1}$ 1.45
 Density, g cm^{-3} 7.1

$$\text{cm}^2/\Omega = \frac{I^2 C_1}{P}$$

I = Current
 C₁ = Temperature factor
 P = Surface load W/cm²

To obtain resistivity at working temperature multiply by the factor C₁ in the following table:

| °C | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| C ₁ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.01 | 1.02 | 1.02 | 1.03 | 1.03 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 |

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|---|------------------------------|---------------|---|--|----------------|
| 12.0 | 0.0128 | 29400 | 803 | 377 | 113 | 12.0 |
| 10.0 | 0.0185 | 17000 | 558 | 314 | 78.5 | 10.0 |
| 9.5 | 0.0205 | 14600 | 503 | 298 | 70.9 | 9.5 |
| 8.25 | 0.0271 | 9560 | 380 | 259 | 53.5 | 8.25 |
| 8.0 | 0.0288 | 8710 | 357 | 251 | 50.3 | 8.0 |
| 7.5 | 0.0328 | 7180 | 314 | 236 | 44.2 | 7.5 |
| 7.0 | 0.0377 | 5840 | 273 | 220 | 38.5 | 7.0 |
| 6.5 | 0.0437 | 4670 | 236 | 204 | 33.2 | 6.5 |
| 6.0 | 0.0513 | 3680 | 201 | 188 | 28.3 | 6.0 |
| 5.5 | 0.0610 | 2830 | 169 | 173 | 23.8 | 5.5 |
| 5.0 | 0.0738 | 2130 | 139 | 157 | 19.6 | 5.0 |
| 4.75 | 0.0818 | 1820 | 126 | 149 | 17.7 | 4.75 |
| 4.5 | 0.0912 | 1550 | 113 | 141 | 15.9 | 4.5 |
| 4.25 | 0.102 | 1310 | 101 | 134 | 14.2 | 4.25 |
| 4.0 | 0.115 | 1090 | 89.2 | 126 | 12.6 | 4.0 |
| 3.75 | 0.131 | 897 | 78.4 | 118 | 11.0 | 3.75 |
| 3.5 | 0.151 | 730 | 68.3 | 110 | 9.62 | 3.5 |
| 3.25 | 0.175 | 584 | 58.9 | 102 | 8.30 | 3.25 |
| 3.0 | 0.205 | 459 | 50.2 | 94.2 | 7.07 | 3.0 |
| 2.75 | 0.244 | 354 | 42.2 | 86.4 | 5.94 | 2.75 |
| 2.5 | 0.295 | 266 | 34.9 | 78.5 | 4.91 | 2.5 |
| 2.25 | 0.365 | 194 | 28.2 | 70.7 | 3.98 | 2.25 |
| 2.0 | 0.462 | 136 | 22.3 | 62.8 | 3.14 | 2.0 |
| 1.8 | 0.570 | 99.2 | 18.1 | 56.5 | 2.54 | 1.8 |
| 1.7 | 0.639 | 83.6 | 16.1 | 53.4 | 2.27 | 1.7 |
| 1.6 | 0.721 | 69.7 | 14.3 | 50.3 | 2.01 | 1.6 |
| 1.5 | 0.821 | 57.4 | 12.5 | 47.1 | 1.77 | 1.5 |
| 1.4 | 0.942 | 46.7 | 10.9 | 44.0 | 1.54 | 1.4 |
| 1.3 | 1.09 | 37.4 | 9.42 | 40.8 | 1.33 | 1.3 |
| 1.2 | 1.28 | 29.4 | 8.03 | 37.7 | 1.13 | 1.2 |
| 1.1 | 1.53 | 22.6 | 6.75 | 34.6 | 0.950 | 1.1 |
| 1.0 | 1.85 | 17.0 | 5.58 | 31.4 | 0.785 | 1.0 |
| 2.2 | 0.382 | | | | | |

Regarding standard stock items, please contact your local Kanthal subsidiary/representative or Kanthal, Sweden.

$$R = \frac{1.85}{T}$$



Wire mm

6.5-0.02 mm Ø
 Resistivity $\Omega \text{ mm}^2 \text{ m}^{-1}$ 1.09
 Density, g cm^{-3} 8.30

$$\text{cm}^2/\Omega = \frac{l^2 C_t}{\rho}$$

l = Current
 C_t = Temperature factor
 ρ = Surface load W/cm^2

To obtain resistance at working temperature multiply by the factor C_t in the following table:

| °C | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| C_t | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.05 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 | 1.06 | 1.07 | | |

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|---|------------------------------|---------------|---|--|----------------|
| 6.5 | 0.0328 | 6220 | 275 | 204 | 33.2 | 6.5 |
| 6.0 | 0.0386 | 4890 | 235 | 188 | 28.3 | 6.0 |
| 5.5 | 0.0459 | 3770 | 197 | 173 | 23.8 | 5.5 |
| 5.0 | 0.0555 | 2830 | 163 | 157 | 19.6 | 5.0 |
| 4.75 | 0.0615 | 2430 | 147 | 149 | 17.7 | 4.75 |
| 4.5 | 0.0685 | 2060 | 132 | 141 | 15.9 | 4.5 |
| 4.25 | 0.0768 | 1740 | 118 | 134 | 14.2 | 4.25 |
| 4.0 | 0.0867 | 1450 | 104 | 126 | 12.6 | 4.0 |
| 3.75 | 0.0987 | 1190 | 91.7 | 118 | 11.0 | 3.75 |
| 3.5 | 0.113 | 971 | 79.9 | 110 | 9.62 | 3.5 |
| 3.25 | 0.131 | 777 | 68.9 | 102 | 8.30 | 3.25 |
| 3.0 | 0.154 | 611 | 58.7 | 94.2 | 7.07 | 3.0 |
| 2.8 | 0.177 | 497 | 51.1 | 88.0 | 6.16 | 2.8 |
| 2.5 | 0.222 | 354 | 40.7 | 78.5 | 4.91 | 2.5 |
| 2.25 | 0.274 | 258 | 33.0 | 70.7 | 3.98 | 2.25 |
| 2.0 | 0.347 | 181 | 26.1 | 62.8 | 3.14 | 2.0 |
| 1.8 | 0.428 | 132 | 21.1 | 56.5 | 2.54 | 1.8 |
| 1.7 | 0.480 | 111 | 18.8 | 53.4 | 2.27 | 1.7 |
| 1.6 | 0.542 | 92.7 | 16.7 | 50.3 | 2.01 | 1.6 |
| 1.5 | 0.617 | 76.4 | 14.7 | 47.1 | 1.77 | 1.5 |
| 1.4 | 0.708 | 62.1 | 12.8 | 44.0 | 1.54 | 1.4 |
| 1.3 | 0.821 | 49.7 | 11.0 | 40.8 | 1.33 | 1.3 |
| 1.2 | 0.964 | 39.1 | 9.39 | 37.7 | 1.13 | 1.2 |
| 1.1 | 1.15 | 30.1 | 7.89 | 34.6 | 0.950 | 1.1 |
| 1.0 | 1.39 | 22.6 | 6.52 | 31.4 | 0.785 | 1.0 |
| 0.95 | 1.54 | 19.4 | 5.88 | 29.8 | 0.709 | 0.95 |
| 0.90 | 1.71 | 16.5 | 5.28 | 28.3 | 0.636 | 0.90 |
| 0.85 | 1.92 | 13.9 | 4.71 | 26.7 | 0.567 | 0.85 |
| 0.80 | 2.17 | 11.6 | 4.17 | 25.1 | 0.503 | 0.80 |
| 0.75 | 2.47 | 9.55 | 3.67 | 23.6 | 0.442 | 0.75 |
| 0.70 | 2.83 | 7.76 | 3.19 | 22.0 | 0.385 | 0.70 |
| 0.65 | 3.28 | 6.22 | 2.75 | 20.4 | 0.332 | 0.65 |
| 0.60 | 3.86 | 4.89 | 2.35 | 18.8 | 0.283 | 0.60 |
| 0.55 | 4.59 | 3.77 | 1.97 | 17.3 | 0.238 | 0.55 |
| 0.50 | 5.55 | 2.83 | 1.63 | 15.7 | 0.196 | 0.50 |
| 0.475 | 6.15 | 2.43 | 1.47 | 14.9 | 0.177 | 0.475 |
| 0.45 | 6.85 | 2.06 | 1.32 | 14.1 | 0.159 | 0.45 |
| 0.425 | 7.68 | 1.74 | 1.18 | 13.4 | 0.142 | 0.425 |
| 0.40 | 8.67 | 1.45 | 1.04 | 12.6 | 0.126 | 0.40 |
| 0.375 | 9.87 | 1.19 | 0.917 | 11.8 | 0.110 | 0.375 |
| 0.35 | 11.3 | 0.971 | 0.799 | 11.0 | 0.0962 | 0.35 |
| 0.325 | 13.1 | 0.777 | 0.689 | 10.2 | 0.0830 | 0.325 |
| 0.30 | 15.4 | 0.611 | 0.587 | 9.42 | 0.0707 | 0.30 |
| 0.28 | 17.7 | 0.497 | 0.511 | 8.80 | 0.0616 | 0.28 |
| 0.26 | 20.5 | 0.398 | 0.441 | 8.17 | 0.0531 | 0.26 |

Wire mm

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|----------------------------------|-----------------------|---------------|-----------------------------|-----------------------------------|----------------|
| 0.25 | 22.2 | 0.354 | 0.407 | 7.85 | 0.0491 | 0.25 |
| 0.24 | 24.1 | 0.313 | 0.375 | 7.54 | 0.0452 | 0.24 |
| 0.23 | 26.2 | 0.275 | 0.345 | 7.23 | 0.0415 | 0.23 |
| 0.22 | 28.7 | 0.241 | 0.316 | 6.91 | 0.0380 | 0.22 |
| 0.21 | 31.5 | 0.210 | 0.287 | 6.60 | 0.0346 | 0.21 |
| 0.20 | 34.7 | 0.181 | 0.261 | 6.28 | 0.0314 | 0.20 |
| 0.19 | 38.4 | 0.155 | 0.235 | 5.97 | 0.0284 | 0.19 |
| 0.18 | 42.8 | 0.132 | 0.211 | 5.65 | 0.0254 | 0.18 |
| 0.17 | 48.0 | 0.111 | 0.188 | 5.34 | 0.0227 | 0.17 |
| 0.16 | 54.2 | 0.0927 | 0.167 | 5.03 | 0.0201 | 0.16 |
| 0.15 | 61.7 | 0.0764 | 0.147 | 4.71 | 0.0177 | 0.15 |
| 0.14 | 70.8 | 0.0621 | 0.128 | 4.40 | 0.0154 | 0.14 |
| 0.13 | 82.1 | 0.0497 | 0.110 | 4.08 | 0.0133 | 0.13 |
| 0.12 | 96.4 | 0.0391 | 0.0939 | 3.77 | 0.0113 | 0.12 |
| 0.11 | 115 | 0.0301 | 0.0789 | 3.46 | 0.00950 | 0.11 |
| 0.10 | 139 | 0.0226 | 0.0652 | 3.14 | 0.00785 | 0.10 |
| 0.090 | 171 | 0.0165 | 0.0528 | 2.83 | 0.00636 | 0.090 |
| 0.080 | 217 | 0.0116 | 0.0417 | 2.51 | 0.00503 | 0.080 |
| 0.070 | 283 | 0.00776 | 0.0319 | 2.20 | 0.00385 | 0.070 |
| 0.060 | 386 | 0.00489 | 0.0235 | 1.88 | 0.00283 | 0.060 |
| 0.050 | 555 | 0.00283 | 0.0163 | 1.57 | 0.00196 | 0.050 |
| 0.040 | 867 | 0.00145 | 0.0104 | 1.26 | 0.00126 | 0.040 |
| 0.030 | 1540 | 0.000611 | 0.00587 | 0.942 | 0.000707 | 0.030 |
| 0.020 | 3470 | 0.000181 | 0.00261 | 0.628 | 0.000314 | 0.020 |

This table is only meant for element calculations. Regarding standard stock items, please contact your local Kanthal subsidiary/representative or Kanthal Electroheat, Sweden.

Wire mm

12.0–0.05 mm Ø
 Resistivity, $\Omega \text{ mm}^2 \text{ m}^{-1}$ 1.39
 Density, g cm^{-3} 7.15

$$\text{cm}^2/\Omega = \frac{I^2 C_t}{P}$$

I = Current
 C_t = Temperature factor
 P = Surface load W/cm^2

To obtain resistivity at working temperature multiply by the factor C_t in the following table:

| °C | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| C_t | 1.00 | 1.00 | 1.01 | 1.01 | 1.02 | 1.03 | 1.04 | 1.04 | 1.05 | 1.05 | 1.06 | 1.06 | 1.06 | 1.06 | 1.07 |

| Diameter mm | Resistance Ω/m 20°C | cm^2/Ω 20°C | Weight g/m | Surface area cm^2/m | Cross sectional area mm^2 | Diameter mm |
|----------------|---|------------------------------|---------------|---|--|----------------|
| 12.0 | 0.0123 | 30700 | 809 | 377 | 113 | 12.0 |
| 10.0 | 0.0177 | 17800 | 562 | 314 | 78.5 | 10.0 |
| 9.5 | 0.0196 | 15200 | 507 | 298 | 70.9 | 9.5 |
| 8.0 | 0.0277 | 9090 | 359 | 251 | 50.3 | 8.0 |
| 7.5 | 0.0315 | 7490 | 316 | 236 | 44.2 | 7.5 |
| 7.0 | 0.0361 | 6090 | 275 | 220 | 38.5 | 7.0 |
| 6.5 | 0.0419 | 4870 | 237 | 204 | 33.2 | 6.5 |
| 6.0 | 0.0492 | 3830 | 202 | 188 | 28.3 | 6.0 |
| 5.5 | 0.0585 | 2950 | 170 | 173 | 23.8 | 5.5 |
| 5.0 | 0.0708 | 2220 | 140 | 157 | 19.6 | 5.0 |
| 4.75 | 0.0784 | 1900 | 127 | 149 | 17.7 | 4.75 |
| 4.5 | 0.0874 | 1620 | 114 | 141 | 15.9 | 4.5 |
| 4.25 | 0.0980 | 1360 | 101 | 134 | 14.2 | 4.25 |
| 4.0 | 0.111 | 1140 | 89.8 | 126 | 12.6 | 4.0 |
| 3.75 | 0.126 | 936 | 79.0 | 118 | 11.0 | 3.75 |
| 3.5 | 0.144 | 761 | 68.8 | 110 | 9.62 | 3.5 |
| 3.25 | 0.168 | 609 | 59.3 | 102 | 8.30 | 3.25 |
| 3.0 | 0.197 | 479 | 50.5 | 94.2 | 7.07 | 3.0 |
| 2.8 | 0.226 | 390 | 44.0 | 88.0 | 6.16 | 2.8 |
| 2.5 | 0.283 | 277 | 35.1 | 78.5 | 4.91 | 2.5 |
| 2.25 | 0.350 | 202 | 28.4 | 70.7 | 3.98 | 2.25 |
| 2.0 | 0.442 | 142 | 22.5 | 62.8 | 3.14 | 2.0 |
| 1.9 | 0.490 | 122 | 20.3 | 59.7 | 2.84 | 1.9 |
| 1.8 | 0.546 | 104 | 18.2 | 56.5 | 2.54 | 1.8 |
| 1.7 | 0.612 | 87.2 | 16.2 | 53.4 | 2.27 | 1.7 |
| 1.6 | 0.691 | 72.7 | 14.4 | 50.3 | 2.01 | 1.6 |
| 1.5 | 0.787 | 59.9 | 12.6 | 47.1 | 1.77 | 1.5 |
| 1.4 | 0.903 | 48.7 | 11.0 | 44.0 | 1.54 | 1.4 |
| 1.3 | 1.05 | 39.0 | 9.49 | 40.8 | 1.33 | 1.3 |
| 1.2 | 1.23 | 30.7 | 8.09 | 37.7 | 1.13 | 1.2 |
| 1.1 | 1.46 | 23.6 | 6.79 | 34.6 | 0.950 | 1.1 |
| 1.0 | 1.77 | 17.8 | 5.62 | 31.4 | 0.785 | 1.0 |

Regarding standard stock items, please contact your local Kanthal subsidiary/representative or Kanthal, Sweden.