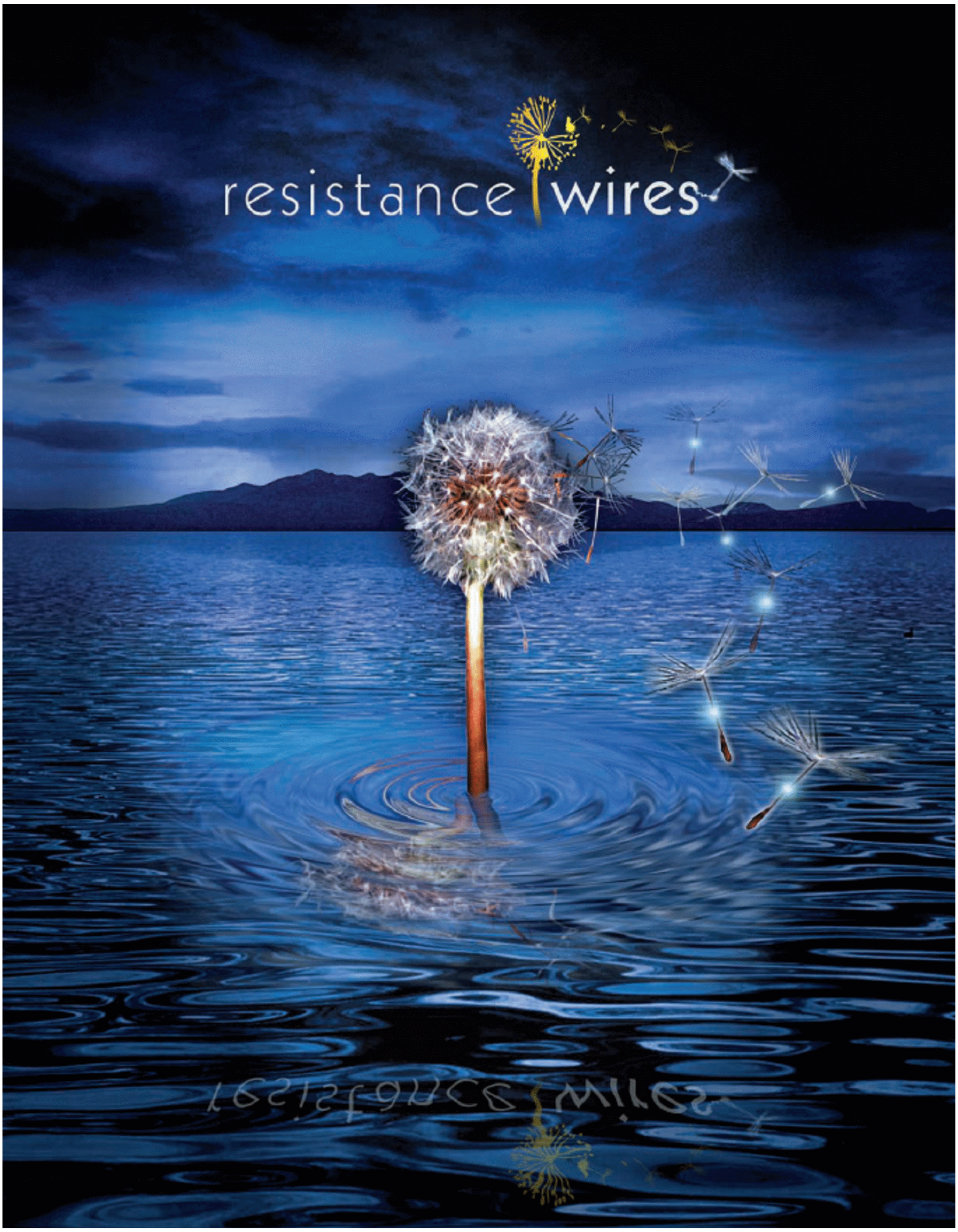

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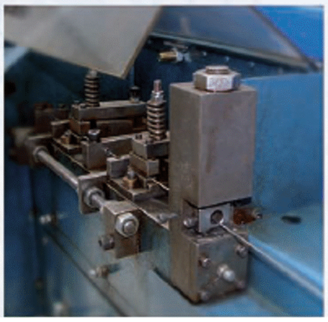
introducing **RESISTANCE WIRES**

Founded in 1959, Resistance Wires was one of the early producers of resistance wire and ribbon and to this day manufactures these products in the UK.

our aims are simple:

- Provide a quality product fit for purpose.
- Provide our customers with the quantity they require - **no matter how small.**
- Offer from stock or manufacture to order.
- Provide a professional, friendly and personal service.



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APPLICATIONS

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PACKAGING

Resistance Wires offer varied packaging in the form of coils, spools and cut-lengths, details of which are shown below.

Special packaging to individual requirements can also be provided on request.

PACKAGING	WIRE DIAMETER RANGE (mm)	APPROX. NET WEIGHT			
		WIRE (Kg)	**RIBBON** (Kg)	**WIRE** (lbs)	**RIBBON** (lbs)
Coil	5.5 - 0.5	1- 100	-	2-200	-
DIN 250 Spool	2.0 - 0.25	20	-	40	-
DIN 200 Spool	1.0 - 0.25	10	10	20	20
DIN 160 Spool	1.0 - 0.25	7	7	15	15
DIN 125 Spool	1.0 - 0.25	3	4	7	8
DIN 100 Spool	0.3 - 0.15	1.8	2	4	4
DIN 80 Spool	0.2 - 0.05	0.9	1	2	2
DIN 50 Spool	0.05 - 0.02	0.1	-	0.2	-

FRINKO

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TOLERANCES

The tolerance on wire diameter and its resistance shall not vary by more than the following:-

DIAMETER			TOLERANCE ON DIAMETER	
.0254	mm (.001")	to < .051mm (.002")	+/- .00254	mm (.0001")
.051	mm (.002")	to < .375mm (.0148")	+/- .0051	mm (.0002")
.375	mm (.0148")	to < .800mm (.032")	+/- .0102	mm (.0004")
.801	mm (.032")	to < 1.25mm (.048")	+/- .0127	mm (.0005")
1.25	mm (.048")	to < 2.00mm (.080")	+/- .0152	mm (.0006")
2.00	mm (.080")	to < 3.25mm (.128")	+/- .020	mm (.0008")
3.25	mm (.128")	to < 4.75mm (.1875")	+/- .0254	mm (.001")
4.75	mm (.1875")	to < 5.50mm (.212")	+/- .038	mm (.0015")

DIAMETER			TOLERANCE ON RESISTANCE PER UNIT LENGTH
.0254	mm (.001")	to < .051mm (.002")	+/- 12%
.051	mm (.002")	to < .076mm (.003")	+/- 10%
.076	mm (.003")	to < .15mm (.006")	+/- 7%
> .15	mm (.006")		+/- 5%

The tolerance on resistance for ribbon shall not vary by more than +/-5%

CHOICE OF MATERIALS

ELECTRICAL RESISTANCE ALLOYS

GRADE	APPROXIMATE CHEMICAL COMPOSITION	CHARACTERISTICS AND TYPICAL APPLICATIONS	SPECIFICATION REFERENCE NUMBERS	ELECTRICAL RESISTIVITY AT 20°C (Microhms/cm³)	DENSITY (g/cm³)	MAXIMUM OPERATING TEMPERATURE	MELTING POINT	COEFFICIENT OF EXPANSION (µm/m. °C) AT 20-100°C	ELECTRICAL RESISTIVITY AT 20°C (Ohm. Circ. Mil/ft)
RW 80	NICKEL 80% CHROME 20%	This alloy is for use at operating temperatures up to 1200°C. Applications include heating elements in both domestic and industrial appliances and in control resistors.	W.NR. 2.4869 UNS NO6003	108	8.31	1200°C 2200°F	1400°C 2550°F	12.5	650
RW 60	NICKEL 60% CHROME 16% IRON 24%	A nickel-chrome alloy for use at operating temperatures up to 1100°C with a medium temperature-coefficient of resistance and good oxidation resistance.	W.NR. 2.4867 UNS NO6004	110	8.24	1100°C 2010°F	1420°C 2560°F	12.5	662
RW 45	NICKEL 45% COPPER 55%	A copper-nickel alloy used mainly for its medium range electrical resisitivity and very low temperature-coefficient of resistance.	W.NR. 2.0842	49	8.89	400°C 750°F	1270°C 2320°F	14.7	295
RW 135	IRON BAL CHROME 20% ALUMINIUM 5%	This iron-chrome aluminium alloy performs well at high temperatures although cold working is inferior to nickel-chrome alloys. It also has high resistivity.	W.NR. 1.4767	137	7.2	1250°C 2280°F	1500°C 2730°F	15	827

HOT CUTTING WIRES

NAME	CHARACTERISTICS AND TYPICAL APPLICATIONS	ELECTRICAL RESISTIVITY AT 20ºC (Microhms/cm²)	DENSITY (g/cm³)	MAXIMUM OPERATING TEMPERATURE	MELTING POINT	COEFFICIENT OF EXPANSION (µm/m. ºC) AT 20-100ºC
HOT CUT 70	These hot cutting wires have high strength at elevated temperatures and are used for cutting polystyrene (EPS) and or heat sealing woven polypropylene bags. RW 118 has the best performance on many different machine models. Some machines and operations prefer RW 122 or RW 70.	70	8.00	950ºC 1740ºF	1375ºC 2500ºF	17.6
HOT CUT 118		118	8.18	950ºC 1740ºF	1370ºC 2500ºF	12.7
HOT CUT 122		122	8.28	700ºC 1292ºF	1430ºC 2600ºF	12.6
ULTRA CUT 41	This wire has exceptional strength at elevated temperatures and is the ultimate highest performing hot cutting wire. It is used on production lines cutting polystyrene (EPS), thermal laminate materials etc. It has an excellent track record for working on machines running 24 hour shifts and on oscillating cutting frames.	131	8.25	980ºC 1800ºF	1345ºC 2450ºF	13.6

HEATING ELEMENT DESIGN & CALCULATION

ELECTRICAL RESISTANCE RIBBON AND WIRE

To perform as a heating element the ribbon or wire must resist the flow of electricity. This resistance converts the electrical energy into heat which is related to the electrical resistivity of the metal, and is defined as the resistance of a unit length of unit cross-sectional-area. Thus, the linear resistance of a length of ribbon or wire may be calculated from its electrical resistivity.

As a heating element, ribbon offers a large surface area and therefore, a greater effective heat radiation in a preferred direction, making it ideal for many domestic appliances like toasters and convector heaters, and industrial applications such as injection moulding band heaters.

An important characteristic of these electrical resistance alloys is their resistance to heat and corrosion, which is due to their formation of oxide surface layers that retard further reaction with the oxygen in air. When selecting the alloy the operating temperature, the material and atmosphere with which it comes into contact must be considered. As there are so many types of applications, variables in element design and different operating conditions, the following equations for element design are given as a guide only. Further assistance may be obtained from Resistance Wires Technical Department.

Where:

- p – Electrical Resistivity (microhm/cm^3)
- R – Element Resistance at 20°C (ohms)
- d – Wire diameter (mm)
- t – Ribbon thickness (mm)
- b – Ribbon width (mm)
- l – Ribbon or Wire Length (m)
- a – Ribbon or Wire cross sectional area (mm^2)

Wire:

$$a = \frac{\pi \times d^2}{4}$$

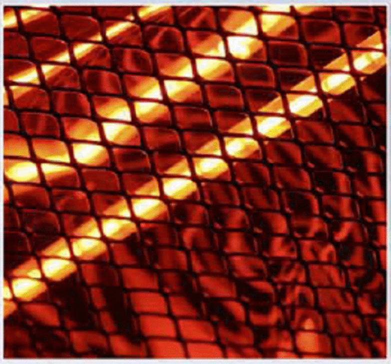
Ribbon:

$$a = t \times (b - t) + (0.786 \times t^2)$$

$$R = \frac{p \times l \times 0.01}{a} \text{ (ohms)}$$

ELECTRICAL RESISTANCE AT OPERATING TEMPERATURE

With very few exceptions the resistance of a metal will change with temperature, which must be allowed for when designing an element. As the resistance of an element is calculated at operating temperature, the resistance of the element at room temperature must be found. To obtain the element's resistance at room temperature, divide the resistance at operating temperature by the temperature-resistance factor shown below.



Where:

F – Temperature-Resistance Factor

R_t – Element Resistance at Operating Temperature (ohms)

R – Element Resistance at 20°C (ohms)

$$R = \frac{R_t}{F} \text{ (ohms)}$$

Alloy	Temperature-Resistance Factor (F) at:												
	20°C	100°C	200°C	300°C	400°C	500°C	600°C	700°C	800°C	900°C	1000°C	1100°C	1200°C
RW80	1.00	1.006	1.015	1.028	1.045	1.065	1.068	1.057	1.051	1.052	1.062	1.071	1.080
RW60	1.00	1.012	1.022	1.046	1.064	1.082	1.092	1.100	1.107	1.114	1.123	1.132	-
RW135	1.00	1.005	1.009	1.014	1.022	1.035	1.046	1.055	1.061	1.066	1.070	1.072	1.073

45/55 changes little in resistance as temperature rises, having a temperature-resistance factor of +0.00003/°C in the 20-100°C range.

SURFACE AREA LOADING

It is possible to design an element in a variety of sizes all of which would in theory give the desired wattage load or power density dissipated per unit area. However, it is essential that the load on the surface of the element is not too high as the transfer of heat by conduction, convection or radiation from the element may not be rapid enough to prevent it over-heating and failing prematurely.

The suggested surface loading range for the type of appliance and element are shown opposite – but this may need to be lower for an element working with more frequent operating cycles, or at nearly its maximum operating temperature, or in harsh atmospheres.

Appliance	Element Type Loading Range	Suggested Surface Area Loading (W/cm^2)
Fire	Spiral Element	4.5 – 6.0
Fire	Pencil Bar	6.0 – 9.5
Iron	Mica-Wound Element	4.0 – 5.5
Toaster	Mica-Wound Element	3.0 – 4.0
Convector	Spiral Element	3.5 – 4.5
Storage Heater	Spiral Element	1.5 – 2.5
Fan Heater	Spiral Element	9.0 – 15.0
Oven Element	Sheathed Element	8.0 – 12.0
Grill Element	Sheathed Element	15.0 – 20.0
Hotplate	Sheathed Element	17.0 – 22.0
Water Immersion Heater	Sheathed Element	25.0 – 35.0
Kettle Element	Sheathed Element	35.0 – 50.0

DESIGNING A **WIRE** ELEMENT

Where:

V – Voltage (volts) **W –** Wattage (watts) **S –** Surface Area Loading (W/cm2)

R_t – Element resistance at operating temperature (ohms) **R –** Element Resistance at 20°C (ohms)

F – Temperature-resistance factor **l –** Wire length (m)

Example:

1. To calculate the wire diameter and length required for a 750w/240v pencil bar fire element, operating at a maximum temperature of 1100°C, the total resistance of the element at operating temperature (**R_t**) will be:

   $$R_t = \frac{V^2}{W} = \frac{240^2}{750} = 76.8 \text{ ohms}$$

2. Using RW80 wire, the temperature-resistance factor (**F**) is 1.071 (see page 6). Thus, the total resistance of the element at 20°C (**R**) will be:

   $$R = \frac{R_t}{F} = \frac{76.8}{1.071} = 71.71 \text{ ohms}$$

3. Knowing the dimensions of the pencil bar, the length of wire that may be wound round it may be estimated. Thus, the resistance required per metre of wire will be:
   Assuming a length of wire of 9 metres –

   $$\text{Ohms/m} = \frac{R}{l} = \frac{71.71}{9} = 7.97 \text{ ohms/m}$$

4. From the table on Page 12, an RW80 wire diameter of 0.417mm has a resistance per metre of 7.91 ohms/m which is closest to 7.97 ohms/m.

5. To verify the actual wire length (**l**):
   A change in wire length may mean adding or subtracting turns, or altering the pitch angle of the wire, to achieve the total resistance value.

   $$l = \frac{R}{\text{ohms/m}} = \frac{71.71}{7.91} = 9.066 \text{ m}$$

6. To verify the surface area loading (**S**):

   $$S = \frac{W}{l \times d \times 31.416} = \frac{750}{9.066 \times 0.417 \times 31.416} = 6.31 \text{ W/cm}^2$$

This surface area loading should fall within the range shown above for a pencil bar fire element noting that a higher value gives a hotter element. The surface area loading can be higher or lower if it is considered the heat transfer will be better or worse, depending upon the importance of the element's life.

If your calculated surface area loading is too high or too low you should re-calculate changing one or more of the following:

- The wire length and diameter
- The grade of alloy

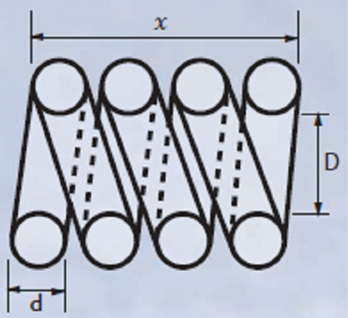
COILED SPIRAL ELEMENTS

Wire elements formed into a coil allow a suitable length of wire to be accommodated in a relatively short space, and also absorb the effects of thermal expansion. When forming the coil care must be taken not to damage the wire by nicking or abrasion. Cleanliness of the element is also important. The maximum and minimum recommended ratios of inside-coil diameter to wire diameter are 6:1 and 3:1. The length of the close wound coil may be found using the Table or equation below.

Where:

d – Wire diameter (mm)
D – Inside-Coil diameter (mm)
L – Length of Wire (m)
x – Length of close wound coil (mm)

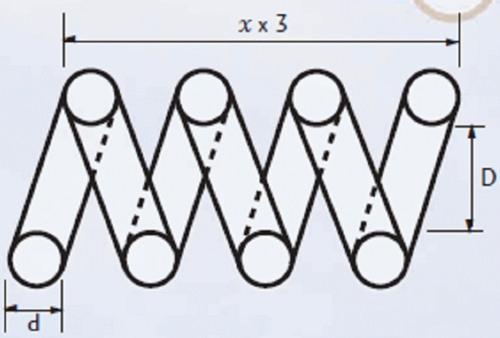
$$x = \frac{L \times d \times 1000 \text{ (mm)}}{\pi \times (D + d)}$$



Wire diameter			Length of Close Wound Coil (mm) per 1 meter length of wire							
			Inside Coil Diameter							
Swg	in	mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm
10	.128	3.25	166	143	125	112	101	92	84	78
11	.116	2.95	158	135	118	105	94	86	79	72
12	.104	2.64	149	127	110	97	87	79	72	67
13	.092	2.34	139	117	101	89	80	72	66	60
14	.080	2.03	129	107	92	81	72	64	59	54
15	.072	1.83	121	100	85	74	66	59	54	49
16	.064	1.63	112	92	78	68	60	54	49	45
17	.056	1.42	102	83	70	61	54	48	43	40
18	.048	1.22	92	74	62	54	47	42	38	35
19	.040	1.02	81	64	54	46	40	36	32	29
20	.036	.91	74	59	49	42	37	33	29	27
21	.032	.81	68	54	45	38	33	29	26	24
22	.028	.71	61	48	40	34	29	26	23	21
23	.024	.61	54	42	35	29	25	23	20	18
24	.022	.56	50	39	32	27	24	21	19	17
25	.020	.51	46	36	29	25	22	19	17	15
26	.018	.46	42	33	27	23	20	17	15	14
27	.0164	.42	39	30	24	21	18	16	14	13
28	.0148	.38	35	27	22	19	16	14	13	12
29	.0136	.35	33	25	21	17	15	13	12	11
30	.0124	.31	30	23	19	16	14	12	11	10
31	.0116	.29	28	22	18	15	13	11	10	9
32	.0108	.27	27	20	17	14	12	11	9	8
33	.0100	.25	25	19	15	13	11	10	9	8

When this close wound coil is stretched, the stretch should be about 3:1 as closer windings will result in hotter coils.

Apart from accidental damage the service life of a heating element may be shortened by localised burn-outs (hot spots). This may be caused by change to the wire's cross section (e.g. nicks, stretching, kinks), or by shielding an area where the element cannot dissipate its heat freely, or by poor supporting points or terminations.



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DESIGNING A **RIBBON** ELEMENT

Where:
b – Ribbon width (mm) **t** – Ribbon thickness (mm)

Example:

1	To calculate the ribbon size and length required for a 600w/220v mica-wound element in an iron, operating at a maximum temperature of 800°C, the total resistance of the element at operating temperature (**R_t**) will be:	$R_t = \frac{V^2}{W} = \frac{220^2}{600} = 80.67$ ohms
2	Using RW60 ribbon, the temperature-resistance factor (**F**) is 1.107 (see page 6). Thus the total resistance of the element at 20°C (**R**) will be:	$R = \frac{R_t}{F} = \frac{80.67}{1.107} = 72.87$ ohms
3	Knowing the dimensions of the mica-board, the length of the ribbon that may be wound round it may be estimated. Thus, the resistance required per metre of ribbon will be: *Assuming a length of tape of 7 metres –*	Ohms/m $= \frac{R}{l} = \frac{72.87}{7} = 10.41$ ohms/m
4	From the table on page 13, a RW60 ribbon size of 1mm x 0.1mm has a resistance per metre of 11.24 ohms/m which is near to 10.41 ohms/m	
5	To verify the actual ribbon length (**l**): A change in ribbon length may mean adding or subtracting turns, or altering the pitch angle of the ribbon, to achieve the total resistance value.	$l = \frac{R}{\text{ohms/m}} = \frac{72.87}{11.24} = 6.483$ m
6	To verify the surface load (**S**):	$S = \frac{W}{20 \times (b+t) \times l} = \frac{600}{20 \times (1+0.1) \times 6.483} = 4.21$ W/cm^2

As explained for wire elements, if your surface loading is too high or low you should re-calculate changing one or more of the following:

- The ribbon length and size
- The grade of alloy

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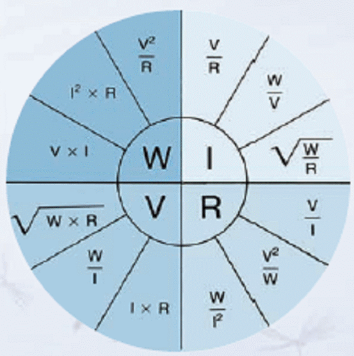
USEFUL INFORMATION

To convert	Multiply by
LENGTH	
Inches to Centimetres	2.5400
Centimetres to Inches	0.3937
Feet to Metres	0.3048
Metres to Feet	3.2810
Yards to Metres	0.9144
Metres to Yards	1.0940
Miles to Kilometres	1.6090
Kilometres to Miles	0.6214
AREA	
Sq. Inches to Sq. Centimetres	6.4520
Sq. Centimetres to Sq. Inches	0.1550
Sq. Metres to Sq. Feet	10.7600
Sq. Feet to Sq. Metres	0.0929
Sq. Yards to Sq. Metres	0.8361
Sq. Metres to Sq. Yards	1.1960
Sq. Miles to Sq. Kilometres	2.5900
Sq. Kilometeres to Sq. Miles	0.3861
MASS	
Ounces to Grams	28.3500
Grams to Ounces	0.0352
Pounds to Grams	453.6000
Grams to Pounds	0.0022
Pounds to Kilograms	0.4536
Kilograms to Pounds	2.2050
Tons to Kilograms	1016.0000
Kilograms to Tons	0.0009

To convert	Multiply by
VOLUME	
Cu. Inches to Cu. Centimetres	16.3900
Cu. Centimetres to Cu. Inches	0.0610
Cu. Feet to Cu. Metres	0.0283
Cu. Metres to Cu. Feet	35.3100
Cu. Yards to Cu. Metres	0.7646
Cu. Metres to Cu. Yards	1.3080
Cu. Inches to Litres	0.0163
Litres to Cu. Inches	61.0300
Gallons to Litres	4.5460
Litres to Gallons	0.2200
U.S. Pint to U.K. Pint	0.8327
U.S. Gallon to U.K. Pint	6.6616
STRESS	
lbf/in^2 to kgf/mm^2	0.000703
kgf/mm^2 to lbf/in^2	0.224809
tonf/in^2 to N/mm^2	15.4443
N/mm^2 to tonf/in^2	0.064749
kgf/mm^2 to N/mm^2	9.80665
N/mm^2 to kgf/mm^2	0.101972
lbf/in^2 to N/mm^2	0.00689476
N/mm^2 to lbf/in^2	145.04
FORCE	
lbf to N	4.44822
N to lbf	0.224809
tonf to kN	9.96402
kN to tonf	0.100361
kgf to N	9.806665
N to kgf	0.101972

To convert	Multiply by
MISCELLANEOUS	
lb/ft to kg/m	1.488
kg/m to lb/ft	0.672
ft/lb to m/kg	0.672
m/kg to ft/lb	1.488
ELECTRICAL	
ohms/yd to ohms/m	1.094
ohms/m to ohms/yd	0.9144
ohms/ft to ohms/m	3.281
ohms/m to ohms/ft	0.3048
microhms/in^3 to microhms/cm^3	2.54
microhms/cm^3 to microhms/in^3	0.3937
microhms to ohms	0.000001
ohms to microhms	1000000
ohms/g to ohms/lb	453.6
ohms/lb to ohms/g	0.002205

OHMS LAW



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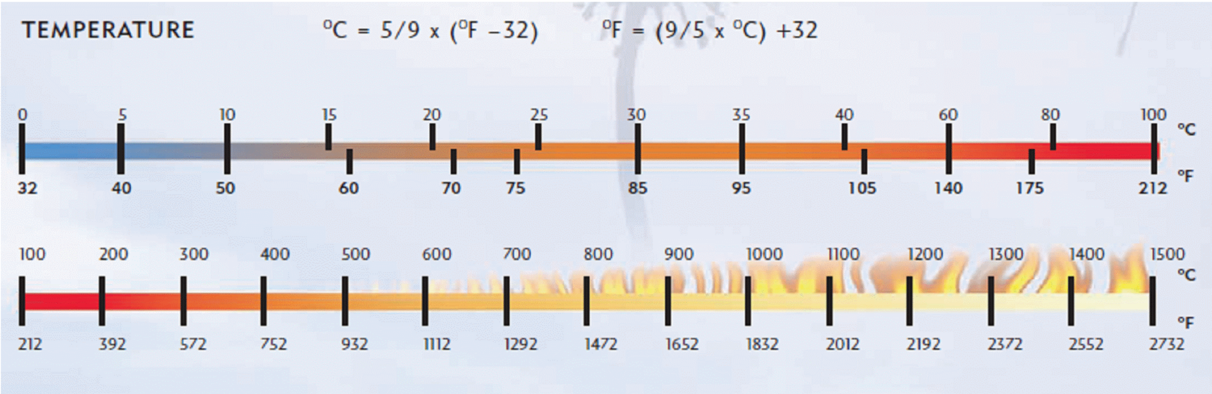
TEMPERATURE
°C = 5/9 x (°F −32)
°F = (9/5 x °C) +32
0 5 10 15 20 25 30 35 40 60 80 100 °C
32 40 50 60 70 75 85 95 105 140 175 212 °F
100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 °C
212 392 572 752 932 1112 1292 1472 1652 1832 2012 2192 2372 2552 2732 °F

RESISTANCES & WEIGHTS OF STANDARD SIZE

Diameter				Linear Electrical Resistance (Ohms/m)				Weight (m/kg)			
				ALLOY				ALLOY			
SWG	B&S	mm	inch	RW80	RW60	RW45	RW135	RW80	RW60	RW45	RW135
		5.5	.217	.0455	.0463	.0206	.0577	5.07	5.11	4.73	5.85
5		5.39	.212	.0473	.0482	.0215	.0600	5.27	5.32	4.93	6.09
	4	5.19	.204	.0511	.0520	.0232	.0648	5.69	5.74	5.32	6.57
		5	.197	.0550	.0560	.0250	.0698	6.13	6.18	5.73	7.07
6		4.88	.192	.0577	.0588	.0262	.0732	6.43	6.49	6.01	7.43
		4.75	.187	.0609	.0621	.0277	.0773	6.79	6.85	6.35	7.84
	5	4.62	.182	.0644	.0656	.0292	.0817	7.18	7.24	6.71	8.29
		4.5	.177	.0679	.0692	.0308	.0861	7.57	7.63	7.07	8.73
7		4.47	.176	.0688	.0701	.0312	.0873	7.67	7.73	7.17	8.85
		4.25	.167	.0766	.0775	.0345	.0966	8.48	8.55	7.93	9.79
	6	4.11	.162	.0814	.0829	.0369	.1033	9.07	9.15	8.48	10.47
8		4.06	.160	.0834	.0850	.0378	.1058	9.30	9.37	8.69	10.73
		4	.157	.0859	.0875	.0390	.1090	9.58	9.66	8.95	11.05
		3.75	.148	.0978	.0996	.0444	.1240	10.90	10.99	10.18	12.58
	7	3.67	.144	.1021	.1040	.0463	.1295	11.38	11.47	10.63	13.13
9		3.66	.144	.1027	.1046.	.0466	.1302	11.44	11.54	10.69	13.20
		3.5	.138	.1123	.1143	.0509	.1424	12.51	12.61	11.69	14.44
10	8	3.25	.128	.1302	.1326	.0591	.1651	14.51	14.63	13.56	16.74
		3	.118	.1528	.1556	.0693	.1938	17.02	17.17	15.91	19.65
11		2.95	.116	.1580	.1609	.0717	.2004	17.61	17.76	16.46	20.32
	9	2.91	.115	.1624	.1654	.0737	.2060	18.09	18.25	16.91	20.88
		2.9	.114	.1635	.1665	.0742	.2074	18.22	18.37	17.03	21.03
		2.8	.110	.1754	.1786	.0796	.2225	19.54	19.71	18.27	22.56
		2.7	.106	.1886	.1921	.0856	.2393	21.02	21.20	19.65	24.26
12		2.64	.104	.1973	.2010	.0895	.2503	21.98	22.17	20.55	25.37
	10	2.6	.102	.2034	.2072	.0923	.2580	22.67	22.86	21.19	26.16
		2.5	.098	.2200	.2241	.0998	.2791	24.51	24.72	22.92	28.29
		2.4	.094	.2387	.2432	.1083	.3028	26.60	26.83	24.86	30.70
13		2.34	.092	.2511	.2558	.1139	.3186	27.98	28.22	26.16	32.30
	11	2.3	.091	.2599	.2648	.1179	.3297	28.96	29.21	27.07	33.43
		2.2	.087	.2841	.2894	.1289	.3604	31.66	31.93	29.59	36.54
		2.1	.083	.3118	.3176	.1415	.3955	34.74	35.03	32.48	40.10
	12	2.05	.0807	.3232	.3333	.1485	.4151	36.46	36.77	34.08	42.08
14		2.03	.0800	.3337	.3399	.1514	.4233	37.18	37.50	34.75	42.91
		2	.0787	.3438	.3501	.1560	.4361	38.30	38.63	35.81	44.21
		1.9	.0748	.3809	.3880	.1728	.4832	42.44	42.80	39.67	48.99
15	13	1.83	.0720	.4106	.4182	.1863	.5209	45.75	46.14	42.77	52.81
		1.8	.0709	.4244	.4323	.1926	.5384	47.29	47.69	44.20	54.58
		1.7	.0669	.4758	.4846	.2159	.6036	53.02	53.47	49.56	61.19
16	14	1.63	.0640	.5176	.5271	.2348	.6565	57.67	58.16	53.91	66.56
		1.6	.0630	.5371	.5471	.2437	.6814	59.85	60.36	55.95	69.08
		1.5	.0591	.6112	.6225	.2773	.7753	68.10	68.68	63.65	78.60
	15	1.45	.0571	.6540	.6661	.2967	.8297	72.87	73.49	68.12	84.11
17		1.42	.0560	.6820	.6946	.3094	.8651	75.99	76.63	71.03	87.70
		1.4	.0551	.7016	.7146	.3183	.8900	78.17	78.84	73.07	90.22
		1.3	.0512	.814	.829	.369	1.032	90.7	91.4	84.7	104.6
	16	1.29	.0508	.826	.842	.375	1.048	92.1	92.9	86.1	106.3
18		1.22	.0480	.924	.941	.419	1.172	102.9	103.8	96.2	118.8
		1.2	.0472	.955	.973	.433	1.211	106.4	107.3	99.5	122.8
	17	1.15	.0453	1.040	1.059	.472	1.319	115.9	116.8	108.3	133.7
		1.1	.0433	1.136	1.157	.516	1.442	126.6	127.7	118.4	146.1
19	18	1.02	.0400	1.322	1.346	.600	1.677	147.3	148.5	137.7	170.0
		1	.0394	1.375	1.401	.624	1.744	153.2	154.5	143.2	176.8
20		.914	.0360	1.646	1.677	.747	2.088	183.4	185.0	171.4	211.7
	19	.912	.0359	1.653	1.684	.750	2.097	184.2	185.8	172.2	212.6
		.9	.0354	1.698	1.729	.770	2.154	189.2	190.8	176.8	218.3
21	20	.813	.0320	2.080	2.119	.944	2.639	231.8	233.8	216.7	267.5
		.8	.0315	2.149	2.188	0.975	2.726	239.4	241.4	223.8	276.3
	21	.724	.0285	2.623	2.672	1.190	3.328	292.3	294.8	273.2	337.4
22		.71	.0280	2.728	2.778	1.238	3.460	303.9	306.5	284.1	350.8
		.7	.0276	2.806	2.858	1.273	3.560	312.7	315.3	292.3	360.9
	22	.643	.0253	3.326	3.388	1.509	4.219	370.6	373.7	346.4	427.7
23		.61	.0240	3.696	3.764	1.677	4.688	411.8	415.3	384.9	475.2

these values are for bright annealed wires measured at room temperature.

Diameter				Linear Electrical Resistance (Ohms/m)				Weight (m/kg)			
				ALLOY				ALLOY			
SWG	B&S	mm	inch	RW80	RW60	RW45	RW135	RW80	RW60	RW45	RW135
		.6	.0236	3.820	3.890	1.733	4.845	425.6	429.2	397.8	491.2
	23	.574	.0226	4.174	4.251	1.894	5.294	465.0	469.0	434.7	536.7
24		.56	.0220	4.385	4.466	1.989	5.562	488.6	492.7	456.7	563.9
25	24	.508	.0200	5.329	5.427	2.418	6.759	593.7	598.8	555.0	685.3
		.5	.0197	5.500	5.602	2.496	6.977	612.9	618.1	572.9	707.4
26	25	.457	.0180	6.584	6.706	2.987	8.352	733.6	739.9	685.8	846.7
27		.417	.0164	7.91	8.05	3.59	10.03	881	889	824	1017
	26	.4	.0157	8.59	8.75	3.90	10.90	958	966	895	1105
28		.376	.0148	9.73	9.91	4.41	12.34	1084	1093	1013	1251
	27	.361	.0142	10.55	10.75	4.79	13.38	1176	1186	1099	1357
29		.345	.0136	11.55	11.77	5.24	14.66	1287	1298	1203	1486
	28	.32	.0126	13.43	13.68	6.09	17.03	1496	1509	1399	1727
30		.315	.0124	13.86	14.12	6.29	17.58	1544	1557	1443	1782
		.3	.0118	15.28	15.56	6.93	19.38	1702	1717	1591	1965
31		.295	.0116	15.80	16.09	7.17	20.04	1761	1776	1646	2032
	29	.287	.0113	16.69	17.00	7.57	21.18	1860	1876	1739	2147
32		.274	.0108	18.32	18.66	8.31	23.23	2041	2058	1908	2355
33	30	.254	.0100	21.31	21.71	9.67	27.04	2375	2395	2220	2741
34		.234	.0092	25.11	25.58	11.39	31.86	2798	2822	2616	3230
	31	.227	.0089	26.69	27.18	12.11	33.85	2973	2999	2779	3432
35		.213	.0084	30.31	30.87	13.75	38.45	3377	3406	3157	3898
	32	.202	.0080	33.70	34.32	15.29	42.75	3755	3787	3510	4334
		.2	.0079	34.38	35.01	15.60	43.61	3830	3863	3581	4421
36		.193	.0076	36.92	37.60	16.75	46.83	4113	4148	3845	4747
	33	.18	.0071	42.44	43.23	19.26	53.84	4729	4769	4420	5458
37		.173	.0068	45.95	46.80	20.85	58.28	5119	5163	4785	5909
	34	.16	.0063	53.71	54.71	24.37	68.14	5985	6036	5595	6908
38		.152	.0060	59.52	60.62	27.00	75.50	6632	6688	6199	7654
		.15	.0059	61.12	62.25	27.73	77.53	6810	6868	6365	7860
	35	.143	.0056	67.25	68.49	30.51	85.30	7493	7556	7004	8648
39		.132	.0052	78.9	80.4	35.8	100.1	8793	8868	8220	10149
	36	.127	.0050	85.3	86.8	38.7	108.1	9500	9580	8880	10964
40		.122	.0048	92.4	94.1	41.9	117.2	10294	10382	9623	11881
	37	.114	.0045	105.8	107.8	48.0	134.2	11790	11890	11020	13607
41		.112	.0044	109.6	111.7	49.7	139.1	12214	12318	11418	14097
42	38	.102	.0040	132.2	134.6	60.0	167.7	14727	14852	13766	16997
		.1	.0039	137.5	140.1	62.4	174.4	15322	15452	14322	17684
43		.091	.0036	166.1	169.1	75.3	210.6	18502	18660	17295	21355
		.090	.00354	169.8	172.9	77.0	215.4	18916	19076	17682	21832
	39	.0897	.00353	170.9	174.1	77.5	216.8	19043	19204	17800	21978
44		.0813	.00320	208.0	211.9	94.4	263.9	23181	23378	21668	26755
		.08	.00315	214.9	218.8	97.5	272.6	23940	24144	22378	27631
	40	.0799	.00315	215.4	219.4	97.7	273.2	24000	24204	22434	27700
45	41	.0711	.00280	272.0	277.1	123.4	345.1	30309	30566	28331	34982
		.07	.00276	280.6	285.8	127.3	356.0	31269	31535	29229	36090
	42	.0635	.00250	341.0	347.3	154.7	432.6	37998	38321	35519	43856
46		.061	.00240	369.6	376.4	167.7	468.8	41177	41526	38490	47525
		.06	.00236	382.0	389.0	173.3	484.5	42561	42922	39784	49122
	43	.0559	.00220	440.1	448.2	199.7	558.2	49033	49449	45834	56592
47	44	.0508	.00200	532.9	542.7	241.8	675.9	59372	59876	55499	68525
		.05	.00197	550.0	560.2	249.6	697.7	61287	61808	57289	70736
	45	.0457	.00180	658.4	670.6	298.7	835.2	73363	73986	68577	84673
48	46	.0406	.00160	834	850	378	1058	92952	93741	86887	107282
		.04	.00157	859	875	390	1090	95761	96575	89514	110524
	47	.0356	.00140	1085	1105	492	1376	120895	121922	113008	139533
49	48	.0305	.00120	1478	1506	671	1875	164706	166105	153960	190098
		.03	.00118	1528	1556	693	1938	170242	171688	159135	196488
	49	.0279	.00110	1767	1799	801	2241	196834	198507	183993	227180
50		.0254	.00100	2131	2171	967	2704	237488	239506	221994	247101
		.0229	.00090	2622	2671	1190	3326	292172	294654	273110	337215
		.0203	.00080	3337	3399	1514	4233	371807	374965	347549	429127
		.0178	.00070	4340	4420	1969	5505	483581	487689	452032	558133
		.0152	.00060	5952	6062	2700	7550	663166	668800	619900	765404

Width x thickness millimetre (mm)			Linear Electrical Resistance (Ohms/m) ALLOY RW80	RW60	RW45	RW135	Weight (m/kg) ALLOY RW80	RW60	RW45	RW135
		.25	0.873	0.890	0.396	1.108	97	98	91	112
5	x	.3	0.729	0.743	0.331	0.925	81	82	76	94
		.5	0.441	0.450	0.200	0.560	49	50	46	57
		.2	1.365	1.390	0.619	1.731	152	153	142	175
4	x	.25	1.095	1.115	0.497	1.389	122	123	114	141
		.3	0.915	0.932	0.415	1.160	102	103	95	118
		.5	0.555	0.565	0.252	0.704	62	62	58	71
		.1	3.626	3.693	1.645	4.599	404	407	378	466
		.15	2.426	2.471	1.101	3.077	270	273	253	312
3	x	.2	1.826	1.860	0.828	2.316	203	205	190	235
		.25	1.466	1.493	0.665	1.860	163	165	153	189
		.3	1.226	1.249	0.556	1.556	137	138	128	158
		.1	4.357	4.438	1.977	5.527	486	490	454	560
		.15	2.917	2.971	1.324	3.701	325	328	304	375
2.5	x	.2	2.198	2.238	0.997	2.788	245	247	229	283
		.25	1.766	1.798	0.801	2.240	197	198	184	227
		.3	1.478	1.505	0.671	1.875	165	166	154	190
		.1	5.458	5.559	2.476	6.924	608	613	569	702
		.15	3.659	3.726	1.660	4.641	408	411	381	471
2	x	.2	2.759	2.810	1.252	3.500	307	310	287	355
		.25	2.219	2.260	1.007	2.815	247	249	231	285
		.3	1.860	1.894	0.844	2.359	207	209	194	239
		.1	7.304	7.439	3.314	9.266	814	821	761	939
		.15	4.905	4.996	2.225	6.222	547	551	511	631
1.5	x	.2	3.706	3.774	1.681	4.701	413	416	386	477
		.25	2.987	3.042	1.355	3.788	333	336	311	384
		.3	2.507	2.554	1.138	3.181	279	282	261	322
		.05	21.83	22.24	9.91	27.70	2433	2453	2274	2808
		.1	11.04	11.24	5.01	14.00	1230	1240	1149	1419
1	x	.15	7.439	7.577	3.375	9.436	829	836	775	957
		.2	5.641	5.746	2.560	7.156	629	634	588	725
		.25	4.564	4.649	2.071	5.790	509	513	475	587
		.05	44.14	44.96	20.03	56.00	4919	4961	4598	5677
		.1	22.57	22.98	10.24	28.63	2514	2536	2350	2902
.5	x	.15	15.39	15.67	6.98	19.52	1715	1729	1603	1979
		.2	11.81	12.03	5.36	14.98	1316	1327	1230	1519
		.25	9.68	9.85	4.39	12.27	1078	1087	1008	1244
		.05	90.3	91.9	41.0	114.5	10057	10143	9401	11608
.25	x	.1	47.24	48.12	21.43	59.93	5264	5309	4921	6076
		.15	33.04	33.65	14.99	41.29	3682	3713	3442	4249

these values are for bright annealed ribbon measured at room temperature.
If required size is not shown, please enquire.

Width x thickness inch		Linear Electrical Resistance (Ohms/m) ALLOY RW80	RW60	RW45	RW135	Weight (m/kg) ALLOY RW80	RW60	RW45	RW135
.1875 x	.006	1.498	1.526	0.680	1.901	167	168	156	193
	.008	1.126	1.147	0.511	1.429	125	127	117	145
	.010	0.903	0.920	0.410	1.146	101	101	94	116
.156 x	.006	1.803	1.837	0.818	2.288	201	203	188	232
	.008	1.356	1.381	0.615	1.720	151	152	141	174
	.009	1.207	1.230	0.548	1.531	135	136	126	155
	.010	1.088	1.108	0.494	1.380	121	122	113	140
.125 x	.003	4.487	4.570	2.036	5.692	500	504	467	577
	.004	3.371	3.434	1.529	4.276	376	379	351	434
	.006	2.255	2.297	1.023	2.861	251	253	235	290
	.008	1.697	1.729	0.770	2.153	189	191	177	218
	.010	1.363	1.388	0.618	1.728	152	153	142	175
.09375 x	.003	5.993	6.104	2.719	7.602	668	673	624	771
	.004	4.505	4.589	2.044	5.715	502	506	469	579
	.006	3.017	3.073	1.369	3.828	336	339	314	388
	.008	2.274	2.316	1.032	2.884	253	255	237	292
	.010	1.827	1.861	0.829	2.318	204	205	190	235
.0625 x	.003	9.02	9.19	4.09	11.44	1005	1014	940	1160
	.004	6.789	6.915	3.080	8.612	756	763	707	873
	.006	4.558	4.642	2.068	5.781	508	512	475	586
	.008	3.442	3.506	1.562	4.367	384	387	359	443
	.010	2.773	2.825	1.258	3.518	309	312	289	357
.05 x	.003	11.31	11.51	5.13	14.34	1260	1270	1177	1454
	.004	8.52	8.67	3.86	10.80	949	957	887	1095
	.006	5.727	5.833	2.598	7.265	638	644	596	737
	.008	4.333	4.414	1.966	5.497	483	487	451	557
	.010	3.498	3.562	1.587	4.437	390	393	364	450
.03125 x	.003	18.23	18.57	8.27	23.13	2031	2049	1899	2344
	.004	13.77	14.02	6.25	17.47	1534	1547	1434	1771
	.006	9.31	9.48	4.22	11.81	1037	1046	970	1197
	.008	7.084	7.215	3.214	8.986	789	796	738	911
	.010	5.751	5.857	2.609	7.295	641	646	599	740
.025 x	.002	34.06	34.69	15.45	43.21	3795	3828	3548	4381
	.003	22.91	23.33	10.39	29.06	2553	2574	2386	2946
	.004	17.33	17.65	7.86	21.99	1931	1948	1805	2229
	.006	11.76	11.98	5.34	14.92	1311	1322	1225	1513
	.008	8.99	9.15	4.08	11.40	1001	1010	936	1156
.0156 x	.002	55.17	56.19	25.03	69.98	6147	6199	5746	7095
	.003	37.30	38.00	16.93	47.32	4157	4192	3885	4797
	.004	28.38	28.91	12.88	36.01	3163	3190	2956	3650
	.005	23.04	23.47	10.45	29.23	2567	2589	2400	2963
0.010 x	.002	87.4	89.1	39.7	110.9	9743	9826	9107	11245
	.003	59.63	60.73	27.05	75.64	6644	6700	6210	7668
	.004	45.77	46.62	20.77	58.06	5100	5143	4767	5886
	.005	37.49	38.19	17.01	47.56	4177	4213	3905	4821

If required size is not shown, please enquire.

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