

Special Alloy Wire for Heating, Corrosion Resistance or Strength Applications - TUNGW

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

I = Current
 C_t = Temperature factor
 p = Surface load W/in²

Common Names: Tungsten, Pure Tungsten, Tungsten 99.95%, Wolframite

Uses: Typical uses include resistance heated evaporation sources and materials for vacuum evaporation (a.k.a. vacuum metallizing), tungsten filaments and boats, electron beam filaments, custom manufactured high temperature components, light sources, and very high temperature heating elements in vacuum tubes. Tungsten is a grayish-white lustrous metal, which is a solid at room temperature. Tungsten has the highest melting point and lowest vapor pressure of all metals, and at temperatures over 1650°C has the highest tensile strength. It has excellent corrosion resistance and is attacked only slightly by most mineral acids.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	None/Trace	99.95%

Technical Data

Resistivity (Ω/cm²)	33	Resistivity (Ω/sqmf)	25
Resistivity (μΩ/cm)	5.49	Nom. Temp. Coeff. of Resistance (TCR)	0.00450
Std. Res. Tol. <.020"	5%	Std. Res. Tol. >.020"	3%
Thermal EMF vs. Cu	+0.004	Specific Heat (20°C)	0.0336 cal/g
Density (g/cm³)	19.30	Density (lb/in³)	0.697
Thermal Conductivity	1.274 W/cm ² /°C	Coeff. of Linear Expansion (X 10⁻⁶)	4.30 in/in/°C
Approx. Melting Point	3420°C	Max. Continuous Operating Temp.	3000°C
UTS – Hard (KPSI)	600	YTS Tensile – Hard (KPSI)	
UTS – Stress Relieved (KPSI)		YTS Tensile – Stress Relieved (KPSI)	
UTS – Annealed (KPSI)	250	YTS Tensile – Annealed (KPSI)	
Magnetic Attraction	None	Emissivity – fully oxidized	0.28
Designations/Specifications		Forms Available	Wire, Ribbon, Square

Alloy Data

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm ² /m	cm ² /Ω at 20°C
10.4049	0.0006	0.0004	1640.4584	326.8804	506641.0922
9.2658	0.0008	0.0006	1300.9408	291.0952	357798.7977
8.2515	0.0010	0.0010	1031.6915	259.2276	252683.7669
7.3481	0.0013	0.0016	818.1674	230.8486	178449.6943
6.5437	0.0016	0.0025	648.8353	205.5765	126024.2942
5.8273	0.0021	0.0040	514.5490	183.0710	89000.5601
5.1894	0.0026	0.0064	408.0554	163.0293	62853.7517
4.6213	0.0033	0.0101	323.6021	145.1817	44388.4184
4.1154	0.0041	0.0161	256.6278	129.2880	31347.8772
3.6648	0.0052	0.0256	203.5148	115.1342	22138.4190
3.2636	0.0066	0.0406	161.3943	102.5299	15634.5386
2.9063	0.0083	0.0646	127.9914	91.3054	11041.3845
2.5882	0.0104	0.1027	101.5016	81.3098	7797.6188
2.3048	0.0131	0.1634	80.4943	72.4084	5506.8147
2.0525	0.0166	0.2597	63.8348	64.4815	3889.0088
1.8278	0.0209	0.4130	50.6232	57.4224	2746.4860
1.7249	0.0235	0.5208	45.0813	54.1881	2308.0575
1.6277	0.0264	0.6567	40.1460	51.1361	1939.6165
1.5360	0.0296	0.8281	35.7510	48.2559	1629.9906
1.4495	0.0332	1.0442	31.8372	45.5380	1369.7911
1.3679	0.0373	1.3167	28.3518	42.9731	1151.1278
1.2908	0.0419	1.6604	25.2480	40.5527	967.3704
1.2181	0.0471	2.0937	22.4840	38.2686	812.9466

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm ² /m	cm ² /Ω at 20°C
1.1495	0.0529	2.6401	20.0225	36.1132	683.1739
1.0848	0.0594	3.3291	17.8306	34.0792	574.1171
1.0237	0.0667	4.1979	15.8786	32.1597	482.4693
0.9660	0.0749	5.2934	14.1403	30.3483	405.4515
0.9116	0.0841	6.6749	12.5923	28.6390	340.7283
0.8603	0.0944	8.4169	11.2137	27.0260	286.3370
0.8118	0.1060	10.6136	9.9861	25.5038	240.6283
0.7661	0.1190	13.3835	8.8929	24.0673	202.2162
0.7229	0.1336	16.8763	7.9193	22.7117	169.9359
0.6822	0.1501	21.2806	7.0524	21.4325	142.8086
0.6438	0.1685	26.8344	6.2803	20.2254	120.0117
0.6075	0.1892	33.8376	5.5928	19.0862	100.8539
0.5733	0.2125	42.6685	4.9805	18.0112	84.7544
0.5410	0.2386	53.8041	4.4353	16.9967	71.2248
0.5106	0.2680	67.8458	3.9497	16.0394	59.8550
0.4818	0.3009	85.5521	3.5173	15.1360	50.3002
0.4547	0.3379	107.8794	3.1323	14.2835	42.2707
0.4291	0.3794	136.0336	2.7894	13.4790	35.5229
0.4049	0.4261	171.5354	2.4840	12.7198	29.8523
0.3821	0.4785	216.3025	2.2121	12.0034	25.0869
0.3606	0.5373	272.7528	1.9699	11.3273	21.0822
0.3403	0.6033	343.9354	1.7542	10.6893	17.7168
0.3211	0.6775	433.6952	1.5622	10.0873	14.8886
0.2859	0.8543	689.6043	1.2389	8.9830	10.5146
0.2546	1.0773	1096.5170	0.9825	7.9996	7.4256
0.2268	1.3584	1743.5353	0.7791	7.1238	5.2441
0.2019	1.7130	2772.3376	0.6179	6.3439	3.7035
0.1798	2.1600	4408.2021	0.4900	5.6494	2.6155
0.1601	2.7237	7009.3360	0.3886	5.0310	1.8471
0.1426	3.4346	11145.3126	0.3082	4.4802	1.3044
0.1270	4.3309	17721.7920	0.2444	3.9897	0.9212
0.1131	5.4612	28178.8337	0.1938	3.5529	0.6506
0.1007	6.8865	44806.2288	0.1537	3.1640	0.4595
0.0897	8.6837	71244.8984	0.1219	2.8176	0.3245
0.0799	10.9499	113284.1501	0.0967	2.5092	0.2291
0.0711	13.8076	180129.3698	0.0767	2.2345	0.1618
0.0633	17.4111	286417.7368	0.0608	1.9898	0.1143
0.0564	21.9551	455423.3441	0.0482	1.7720	0.0807
0.0502	27.6848	724153.5549	0.0382	1.5780	0.0570
0.0447	34.9100	1151452.5505	0.0303	1.4053	0.0403
0.0398	44.0208	1830886.5117	0.0240	1.2514	0.0284
0.0355	55.5092	2911231.9195	0.0191	1.1144	0.0201
0.0316	69.9960	4629053.3217	0.0151	0.9924	0.0142
0.0281	88.2634	7360504.1605	0.0120	0.8838	0.0100
0.0251	111.2982	11703693.5485	0.0095	0.7870	0.0071

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