Hyndman Industrial Products Inc.

Alloy Data Table –
ADT2001.12.17.TUNGW.ENG

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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/in^2

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/cmf)	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	+.004	**Specific Heat (20°C)**	0.0336 cal/g
Density (g/cm^3)	19.30	**Density (lb/in^3)**	0.697
Thermal Conductivity	1.274 W/cm/°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

Gage AWG	Diameter Inch	Resistance at 68° F Ω/ft	Resistance at 68° F Ω/lb	Weight lb/1000 ft	Surface area in^2/ft	in^2/Ω at 68°F
000	0.4096	0.0002	0.0002	1102.3371	15.4432	78529.5264
00	0.3648	0.0002	0.0003	874.1918	13.7525	55458.9246
0	0.3249	0.0003	0.0005	693.2647	12.2470	39166.0622
1	0.2893	0.0004	0.0007	549.7831	10.9062	27659.7579
2	0.2576	0.0005	0.0011	435.9972	9.7123	19533.8047
3	0.2294	0.0006	0.0018	345.7610	8.6490	13795.1144
4	0.2043	0.0008	0.0029	274.2005	7.7022	9742.3510
5	0.1819	0.0010	0.0046	217.4506	6.8590	6880.2186
6	0.1620	0.0013	0.0073	172.4459	6.1081	4858.9307
7	0.1443	0.0016	0.0116	136.7556	5.4394	3431.4618
8	0.1285	0.0020	0.0184	108.4520	4.8439	2423.3583
9	0.1144	0.0025	0.0293	86.0062	4.3136	1711.4180
10	0.1019	0.0032	0.0466	68.2059	3.8414	1208.6333
11	0.0907	0.0040	0.0741	54.0897	3.4209	853.5580
12	0.0808	0.0051	0.1178	42.8950	3.0464	602.7976
13	0.0720	0.0064	0.1873	34.0172	2.7129	425.7062
13.5	0.0679	0.0072	0.2362	30.2932	2.5601	357.7496
14	0.0641	0.0080	0.2979	26.9769	2.4159	300.6412
14.5	0.0605	0.0090	0.3756	24.0236	2.2798	252.6490
15	0.0571	0.0101	0.4736	21.3936	2.1514	212.3180
15.5	0.0539	0.0114	0.5973	19.0515	2.0302	178.4252
16	0.0508	0.0128	0.7531	16.9659	1.9159	149.9427
16.5	0.0480	0.0143	0.9497	15.1085	1.8080	126.0070

Gage AWG	Diameter Inch	Resistance at 68° F Ω/ft	Resistance at 68° F Ω/lb	Weight Lb/1000 ft	Surface area in^2/ft	in^2/Ω at 68°F
17	0.0453	0.0161	1.1975	13.4545	1.7061	105.8922
17.5	0.0427	0.0181	1.5100	11.9816	1.6100	88.9883
18	0.0403	0.0203	1.9041	10.6699	1.5194	74.7829
18.5	0.0380	0.0228	2.4011	9.5018	1.4338	62.8451
19	0.0359	0.0256	3.0277	8.4616	1.3530	52.8130
19.5	0.0339	0.0288	3.8179	7.5353	1.2768	44.3823
20	0.0320	0.0323	4.8142	6.7104	1.2049	37.2975
20.5	0.0302	0.0363	6.0706	5.9757	1.1370	31.3436
21	0.0285	0.0407	7.6550	5.3215	1.0730	26.3401
21.5	0.0269	0.0457	9.6527	4.7390	1.0126	22.1354
22	0.0253	0.0514	12.1719	4.2202	0.9555	18.6019
22.5	0.0239	0.0577	15.3485	3.7582	0.9017	15.6324
23	0.0226	0.0648	19.3541	3.3467	0.8509	13.1370
23.5	0.0213	0.0727	24.4051	2.9804	0.8030	11.0399
24	0.0201	0.0817	30.7743	2.6541	0.7578	9.2775
24.5	0.0190	0.0917	38.8058	2.3635	0.7151	7.7965
25	0.0179	0.1030	48.9333	2.1048	0.6748	6.5520
25.5	0.0169	0.1157	61.7038	1.8744	0.6368	5.5061
26	0.0159	0.1299	77.8072	1.6692	0.6009	4.6271
26.5	0.0150	0.1458	98.1132	1.4864	0.5671	3.8885
27	0.0142	0.1638	123.7186	1.3237	0.5351	3.2677
27.5	0.0134	0.1839	156.0065	1.1788	0.5050	2.7461
28	0.0126	0.2065	196.7208	1.0497	0.4766	2.3077
29	0.0113	0.2604	312.7993	0.8325	0.4244	1.6298
30	0.0100	0.3284	497.3717	0.6602	0.3779	1.1510
31	0.0089	0.4141	790.8543	0.5236	0.3366	0.8128
32	0.0080	0.5221	1257.5112	0.4152	0.2997	0.5740
33	0.0071	0.6584	1999.5268	0.3293	0.2669	0.4054
34	0.0063	0.8302	3179.3813	0.2611	0.2377	0.2863
35	0.0056	1.0469	5055.4288	0.2071	0.2117	0.2022
36	0.0050	1.3201	8038.4696	0.1642	0.1885	0.1428
37	0.0045	1.6646	12781.7039	0.1302	0.1679	0.1008
38	0.0040	2.0990	20323.7635	0.1033	0.1495	0.0712
39	0.0035	2.6468	32316.1423	0.0819	0.1331	0.0503
40	0.0031	3.3375	51384.8261	0.0650	0.1185	0.0355
41	0.0028	4.2086	81705.3078	0.0515	0.1056	0.0251
42	0.0025	5.3069	129916.9001	0.0408	0.0940	0.0177
43	0.0022	6.6919	206576.5540	0.0324	0.0837	0.0125
44	0.0020	8.4383	328470.5272	0.0257	0.0746	0.0088
45	0.0018	10.6406	522290.0913	0.0204	0.0664	0.0062
46	0.0016	13.4175	830476.1521	0.0162	0.0591	0.0044
47	0.0014	16.9192	1320512.5860	0.0128	0.0526	0.0031
48	0.0012	21.3348	2099703.2671	0.0102	0.0469	0.0022
49	0.0011	26.9027	3338668.5266	0.0081	0.0418	0.0016
50	0.0010	33.9237	5308706.0944	0.0064	0.0372	0.0011