

## Resistance Wire for Low Temp Heating or Resistors Nickel Alloy - A120

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

$l$  = Current  
 $C_t$  = Temperature factor  
 $p$  = Surface load W/in<sup>2</sup>

**Common Names:** Alloy 120, MWS-120, Balco®, Hytemco®, HAI-380, Pelcoloy, Nickel Alloy 120, NIFE 5200, Alloy K70, Nifethal® 70

**Uses:** Alloy exhibits low resistivity and high temperature coefficient of resistance. Typical applications include voltage regulators, timing devices, temperature sensitive resistors, temperature compensating devices, motor control, heating wires and cables, precision and vitreous resistors, potentiometers, and low temperature heating applications.

### Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
70%	None/Trace	30%	None/Trace							

### Technical Data

<b>Resistivity (Ω/cm)</b>	120	<b>Resistivity (Ω/sqmf)</b>	94
<b>Resistivity (μΩ/cm)</b>	19.95	<b>Nom. Temp. Coeff. of Resistance (TCR)</b>	0.0045
<b>Std. Res. Tol. &lt;.020"</b>	5%	<b>Std. Res. Tol. &gt;.020"</b>	3%
<b>Thermal EMF vs. Cu</b>	-0.04	<b>Specific Heat (20°C)</b>	0.125 cal/g
<b>Density (g/cm<sup>3</sup>)</b>	8.44	<b>Density (lb/in<sup>3</sup>)</b>	0.305
<b>Thermal Conductivity</b>	0.16 W/cm/°C	<b>Coeff. of Linear Expansion (X 10<sup>-6</sup>)</b>	15.00 in/in/°C
<b>Approx. Melting Point</b>	1430°C	<b>Max. Continuous Operating Temp.</b>	600°C
<b>UTS – Hard (KPSI)</b>	150	<b>YTS Tensile – Hard (KPSI)</b>	
<b>UTS – Stress Relieved (KPSI)</b>	120	<b>YTS Tensile – Stress Relieved (KPSI)</b>	
<b>UTS – Annealed (KPSI)</b>	70	<b>YTS Tensile – Annealed (KPSI)</b>	
<b>Magnetic Attraction</b>	Strong	<b>Emissivity – fully oxidized</b>	
<b>Designations/Specifications</b>	ASTM = B267	<b>Forms Available</b>	Wire, Ribbon.

**Temperature Factor** – To obtain resistance at working temperature multiply by the factor  $C_t$ , in the following table:

°C	100	200	300	400	500	600
<b>A120 <math>C_t</math></b>	1.00	1.35	1.80	2.30	2.82	3.40

### Alloy Data

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm <sup>2</sup> /m	cm <sup>2</sup> /Ω at 20°C
10.4049	0.0023	0.0033	717.8476	326.8804	139326.3004
9.2658	0.0030	0.0052	569.2782	291.0952	98394.6694
8.2515	0.0037	0.0083	451.4575	259.2276	69488.0359
7.3481	0.0047	0.0131	358.0216	230.8486	49073.6659
6.5437	0.0059	0.0209	283.9236	205.5765	34656.6809
5.8273	0.0075	0.0332	225.1613	183.0710	24475.1540
5.1894	0.0094	0.0528	178.5608	163.0293	17284.7817
4.6213	0.0119	0.0840	141.6050	145.1817	12206.8151
4.1154	0.0150	0.1336	112.2977	129.2880	8620.6662
3.6648	0.0189	0.2124	89.0560	115.1342	6088.0652
3.2636	0.0238	0.3377	70.6245	102.5299	4299.4981
2.9063	0.0301	0.5369	56.0077	91.3054	3036.3807
2.5882	0.0379	0.8537	44.4161	81.3098	2144.3452
2.3048	0.0478	1.3574	35.2235	72.4084	1514.3740
2.0525	0.0603	2.1584	27.9335	64.4815	1069.4774
1.8278	0.0760	3.4321	22.1522	57.4224	755.2837
1.7249	0.0854	4.3277	19.7271	54.1881	634.7158
1.6277	0.0959	5.4572	17.5675	51.1361	533.3945
1.5360	0.1077	6.8814	15.6443	48.2559	448.2474
1.4495	0.1209	8.6773	13.9316	45.5380	376.6925
1.3679	0.1358	10.9419	12.4065	42.9731	316.5602
1.2908	0.1524	13.7975	11.0483	40.5527	266.0269
1.2181	0.1712	17.3983	9.8388	38.2686	223.5603
1.1495	0.1922	21.9389	8.7617	36.1132	187.8728
1.0848	0.2159	27.6645	7.8025	34.0792	157.8822

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm <sup>2</sup> /m	cm <sup>2</sup> /Ω at 20°C
1.0237	0.2424	34.8844	6.9483	32.1597	132.6791
0.9660	0.2722	43.9885	6.1876	30.3483	111.4992
0.9116	0.3056	55.4685	5.5102	28.6390	93.7003
0.8603	0.3432	69.9446	4.9070	27.0260	78.7427
0.8118	0.3854	88.1986	4.3698	25.5038	66.1728
0.7661	0.4328	111.2166	3.8914	24.0673	55.6094
0.7229	0.4860	140.2417	3.4654	22.7117	46.7324
0.6822	0.5457	176.8418	3.0860	21.4325	39.2724
0.6438	0.6128	222.9937	2.7482	20.2254	33.0032
0.6075	0.6882	281.1903	2.4473	19.0862	27.7348
0.5733	0.7728	354.5749	2.1794	18.0112	23.3074
0.5410	0.8678	447.1113	1.9408	16.9967	19.5868
0.5106	0.9744	563.7977	1.7284	16.0394	16.4601
0.4818	1.0942	710.9368	1.5391	15.1360	13.8326
0.4547	1.2287	896.4761	1.3706	14.2835	11.6244
0.4291	1.3798	1130.4371	1.2206	13.4790	9.7688
0.4049	1.5494	1425.4569	1.0870	12.7198	8.2094
0.3821	1.7399	1797.4705	0.9680	12.0034	6.8989
0.3606	1.9538	2266.5717	0.8620	11.3273	5.7976
0.3403	2.1940	2858.0983	0.7676	10.6893	4.8721
0.3211	2.4637	3604.0005	0.6836	10.0873	4.0944
0.2859	3.1067	5730.6017	0.5421	8.9830	2.8915
0.2546	3.9174	9112.0397	0.4299	7.9996	2.0420
0.2268	4.9398	14488.7522	0.3409	7.1238	1.4421
0.2019	6.2290	23038.0843	0.2704	6.3439	1.0185
0.1798	7.8546	36632.0937	0.2144	5.6494	0.7192
0.1601	9.9045	58247.4773	0.1700	5.0310	0.5079
0.1426	12.4894	92617.3818	0.1348	4.4802	0.3587
0.1270	15.7488	147267.8271	0.1069	3.9897	0.2533
0.1131	19.8589	234165.6877	0.0848	3.5529	0.1789
0.1007	25.0417	372339.0937	0.0673	3.1640	0.1263
0.0897	31.5770	592044.0440	0.0533	2.8176	0.0892
0.0799	39.8179	941389.5987	0.0423	2.5092	0.0630
0.0711	50.2096	1496872.3789	0.0335	2.2345	0.0445
0.0633	63.3132	2380127.1246	0.0266	1.9898	0.0314
0.0564	79.8366	3784561.2020	0.0211	1.7720	0.0222
0.0502	100.6722	6017705.2492	0.0167	1.5780	0.0157
0.0447	126.9455	9568553.5347	0.0133	1.4053	0.0111
0.0398	160.0755	15214639.6266	0.0105	1.2514	0.0078
0.0355	201.8518	24192293.8642	0.0083	1.1144	0.0055
0.0316	254.5307	38467364.1161	0.0066	0.9924	0.0039
0.0281	320.9578	61165679.8793	0.0052	0.8838	0.0028
0.0251	404.7209	97257518.9661	0.0042	0.7870	0.0019

**Information presentation property of Hyndman Industrial Products, Inc., 4031 Merchant Road, Fort Wayne, IN 46818, 260.483.6042, www.resistancewire.com**

(Disclaimer) This information is provided for information purposes only "As is." Hyndman Industrial Products, Inc. makes no warranty of any kind with respect to the subject matter or accuracy of the information. Hyndman Industrial Products, Inc. specifically disclaims all warranties, expressed, implied or otherwise, including without limitation, all warranties of merchantability and fitness for a particular purpose. This publication may include technical inaccuracies or typographical errors; changes may be made to the information herein. If errors are found, please submit the correction via e-mail to: sales@resistancewire.com. Include correction and page address if possible. All trademarks referenced are the property of their respective owners. Ownership can be researched at www.uspto.gov or by contacting Hyndman Industrial Products, Inc.