HYNDMAN

Alloy Datasheet–
HYNDMAN.MANGANN.DATASHEET.MET

4031 Merchant Road
Fort Wayne, IN 46818
260.483.6042
www.resistancewire.com

Resistance Wire for Low Temp Heating or Resistors
Nickel-Copper-Manganese Alloy - MANGANN

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

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

Common Names: Manganin 43, Manganin 130

Uses: The alloy is used for the manufacture of resistance standards, precision wire wound resistors, potentiometers, shunts and other electrical and electronic components. This Copper-Manganese-Nickel alloy has a very low thermal electromotive force (emf) vs. Copper, which makes it ideal for use in electrical circuits, especially DC, where a spurious thermal emf could cause malfunctioning of electronic equipment. The components in which this alloy is used normally operate at room temperature; therefore, its low temperature coefficient of resistance is controlled over a range of 15 to 35ºC.

Composition

Ni	Cr	Fe	Al	Si	Mn	Cu	C	Ti	Mo	W
4%	None/Trace	None/Trace	None/Trace	None/Trace	11%	Balance	None/Trace	None/Trace	None/Trace	None/Trace

Technical Data

Resistivity (Ω/cmf)	290	**Resistivity (Ω/sqmf)**	227
Resistivity (μΩ/cm)	43	**Nom. Temp. Coeff. of Resistance (TCR)**	0.000015
Std. Res. Tol. <.020"	5%	**Std. Res. Tol. >.020"**	3%
Thermal EMF vs. Cu	<+3.0	**Specific Heat (20°C)**	0.098 cal/g
Density (g/cm³)	8.40	**Density (lb/in³)**	0.286
Thermal Conductivity	0.22 W/cm/°C	**Coeff. of Linear Expansion (X 10^{-6})**	18.00 in/in/°C
Approx. Melting Point	1020°C	**Max. Continuous Operating Temp.**	200°C
UTS – Hard (KPSI)	57	**YTS Tensile – Hard (KPSI)**	26
UTS – Stress Relieved (KPSI)		**YTS Tensile – Stress Relieved (KPSI)**	
UTS – Annealed (KPSI)	40	**YTS Tensile – Annealed (KPSI)**	
Magnetic Attraction	None	**Emissivity – fully oxidized**	
Designations/Specifications	ASTM = B267	**Forms Available**	Wire, Ribbon

Alloy Data

Diameter mm	Resistance at 20° C Ω/m	Resistance at 20° C Ω/kg	Weight kg/1000 m	Surface area cm²/m	cm²/Ω at 20°C
10.4049	0.0057	0.0084	673.1293	326.8804	57652.2622
9.2658	0.0071	0.0134	533.8150	291.0952	40715.0356
8.2515	0.0090	0.0213	423.3339	259.2276	28753.6700
7.3481	0.0114	0.0339	335.7186	230.8486	20306.3445
6.5437	0.0143	0.0538	266.2366	205.5765	14340.6956
5.8273	0.0181	0.0856	211.1349	183.0710	10127.6499
5.1894	0.0228	0.1361	167.4373	163.0293	7152.3235
4.6213	0.0287	0.2165	132.7837	145.1817	5051.0959
4.1154	0.0362	0.3442	105.3021	129.2880	3567.1722
3.6648	0.0457	0.5473	83.5082	115.1342	2519.1994
3.2636	0.0576	0.8702	66.2249	102.5299	1779.1027
2.9063	0.0727	1.3837	52.5187	91.3054	1256.4334
2.5882	0.0916	2.2002	41.6492	81.3098	887.3152
2.3048	0.1156	3.4984	33.0292	72.4084	626.6375
2.0525	0.1457	5.5627	26.1933	64.4815	442.5424
1.8278	0.1837	8.8451	20.7722	57.4224	312.5312
1.7249	0.2063	11.1535	18.4982	54.1881	262.6410
1.6277	0.2317	14.0644	16.4731	51.1361	220.7150
1.5360	0.2602	17.7349	14.6697	48.2559	185.4817
1.4495	0.2921	22.3633	13.0637	45.5380	155.8728
1.3679	0.3281	28.1996	11.6336	42.9731	130.9904
1.2908	0.3684	35.5591	10.3600	40.5527	110.0801
1.2181	0.4137	44.8393	9.2258	38.2686	92.5077
1.1495	0.4645	56.5414	8.2158	36.1132	77.7405
1.0848	0.5216	71.2974	7.3164	34.0792	65.3306
1.0237	0.5858	89.9045	6.5155	32.1597	54.9017
0.9660	0.6578	113.3677	5.8022	30.3483	46.1376
0.9116	0.7386	142.9542	5.1670	28.6390	38.7725

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
0.8603	0.8294	180.2622	4.6013	27.0260	32.5832
0.8118	0.9314	227.3068	4.0976	25.5038	27.3818
0.7661	1.0459	286.6290	3.6490	24.0673	23.0108
0.7229	1.1745	361.4330	3.2495	22.7117	19.3375
0.6822	1.3189	455.7592	2.8938	21.4325	16.2506
0.6438	1.4810	574.7026	2.5770	20.2254	13.6565
0.6075	1.6631	724.6876	2.2949	19.0862	11.4765
0.5733	1.8675	913.8155	2.0436	18.0112	9.6445
0.5410	2.0971	1152.3017	1.8199	16.9967	8.1049
0.5106	2.3549	1453.0277	1.6207	16.0394	6.8111
0.4818	2.6444	1832.2367	1.4433	15.1360	5.7238
0.4547	2.9695	2310.4111	1.2853	14.2835	4.8101
0.4291	3.3345	2913.3788	1.1446	13.4790	4.0423
0.4049	3.7444	3673.7081	1.0193	12.7198	3.3970
0.3821	4.2048	4632.4670	0.9077	12.0034	2.8547
0.3606	4.7217	5841.4414	0.8083	11.3273	2.3990
0.3403	5.3021	7365.9322	0.7198	10.6893	2.0160
0.3211	5.9539	9288.2823	0.6410	10.0873	1.6942
0.2859	7.5078	14768.9896	0.5083	8.9830	1.1965
0.2546	9.4671	23483.6805	0.4031	7.9996	0.8450
0.2268	11.9379	37340.6215	0.3197	7.1238	0.5967
0.2019	15.0534	59374.0838	0.2535	6.3439	0.4214
0.1798	18.9820	94408.7614	0.2011	5.6494	0.2976
0.1601	23.9359	150116.2403	0.1594	5.0310	0.2102
0.1426	30.1826	238694.8550	0.1264	4.4802	0.1484
0.1270	38.0596	379540.7725	0.1003	3.9897	0.1048
0.1131	47.9924	603495.1945	0.0795	3.5529	0.0740
0.1007	60.5174	959597.6934	0.0631	3.1640	0.0523
0.0897	76.3111	1525824.4664	0.0500	2.8176	0.0369
0.0799	96.2267	2426162.8788	0.0397	2.5092	0.0261
0.0711	121.3398	3857761.1279	0.0315	2.2345	0.0184
0.0633	153.0068	6134098.0237	0.0249	1.9898	0.0130
0.0564	192.9383	9753625.8251	0.0198	1.7720	0.0092
0.0502	243.2911	15508916.9375	0.0157	1.5780	0.0065
0.0447	306.7849	24660214.4564	0.0124	1.4053	0.0046
0.0398	386.8491	39211389.1308	0.0099	1.2514	0.0032
0.0355	487.8084	62348729.3790	0.0078	1.1144	0.0023
0.0316	615.1159	99138646.7387	0.0062	0.9924	0.0016
0.0281	775.6480	157637074.1645	0.0049	0.8838	0.0011
0.0251	978.0755	250653483.4660	0.0039	0.7870	0.0008