

Brand Name	ALLOY 90 ¹⁾	
Material Code	2.0811	
Abbreviation	CuNi10	
Chemical Composition (mass components) in % Average values of alloy components		
Cu	Ni	
Rem.	10	

Form of Delivery

ALLOY 90 is supplied in the form of round wires in the range 8.0 to 0.05 mm Ø in bare or enamelled condition, also with rayon or silk

covering. To a limited extent flat wires, stranded wires, ribbons and sheets are also manufactured.

Properties and Application Notes

ALLOY 90 is especially noted for low resistivity and high resistance to oxidation and chemical corrosion. It is used for low-value resistors, for heating wires and mats in heating cords and in heating cables with low conductor temperatures, as well as for tube-weldings "electrical-welding-fittings". Ribbons are used for heating of bimetals. The maximum working temperature in air is 400 °C.

Electrical Resistance in Annealed Condition

Temperature coefficient of electrical resistance between 20 °C and 105 °C 10 ⁻⁶ /K	Electrical resistivity in: µΩ x cm (first line) and Ω/CMF (second line) Reference Values					
	20 °C	100 °C	200 °C	300 °C	400 °C	500 °C
+350 to +450	tolerance ±10 %					
	15.0	15.6	16.2	16.9	17.5	-
	90	94	97	102	105	-

Physical Characteristics (Reference Values)

Density at 20 °C		Melting Point °C	Specific heat at 20 °C J/g K	Thermal conductivity at 20 °C W/m K	Average linear thermal expansion coefficient between 20 °C		Thermal EMF against copper at 20 °C µV/K
g/cm ³	lb/cub in				and 100 °C 10 ⁻⁶ /K	and 400 °C 10 ⁻⁶ /K	
8.9	0.32	1100	0.38	59	16	17.5	- 25

Strength Properties at 20 °C in Annealed Condition

Tensile Strength ²⁾		Elongation (L ₀ = 100 mm) % at nominal diameter in mm				
MPa	psi	0.02 to 0.063	> 0.063 to 0.125	> 0.125 to 0.5	> 0.5 to 1	> 1
290	42050	≈ 8	≈ 15	≈ 20	≥ 20	≥ 25

1) The number "90" indicates the resistivity, expressed in Ohm/cir. mil ft. (see Technical Information).

2) This value applies to wires of 2 mm diameter. For thinner wires the minimum values will substantially increase, depending on the dimensions.

Notes on Treatment

ALLOY 90 can be worked easily. This alloy can be soldered and brazed without difficulty. All known welding methods can be used.

Nominal Diameter d mm	Cross Section mm ²	Weight per 100 m g	DC Resistance Referred to Length at 20 °C Ω / m				
			Nominal Value	Tolerance	Minimum Value	Maximum Value	
0.05	0.001963	1.75	76.4	± 8 %	70.3	82.5	
0.056	0.002463	2.19	60.9		56.0	65.8	
0.06	0.002827	2.52	53.1		48.8	57.3	
0.063	0.003117	2.77	48.1		44.3	52.0	
0.07	0.003848	3.43	39.0		35.9	42.1	
0.071	0.003959	3.52	37.9		34.9	40.9	
0.08	0.005027	4.47	29.8		27.5	32.2	
0.09	0.006362	5.66	23.6		21.7	25.5	
0.10	0.007854	6.99	19.1		17.6	20.6	
0.11	0.009503	8.46	15.8		± 7 %	14.7	16.9
0.112	0.009852	8.77	15.2	14.2		16.3	
0.12	0.01131	10.1	13.3	12.3		14.2	
0.125	0.01227	10.9	12.2	11.4		13.1	
0.13	0.01327	11.8	11.3	10.5		12.1	
0.14	0.01539	13.7	9.74	9.06		10.4	
0.15	0.01767	15.7	8.49	7.89		9.08	
0.16	0.02011	17.9	7.46	6.94		7.98	
0.18	0.02545	22.6	5.89	5.48		6.31	
0.20	0.03142	28.0	4.77	± 6 %		4.49	5.06
0.22	0.03801	33.8	3.95		3.71	4.18	
0.224	0.03941	35.1	3.81		3.58	4.03	
0.25	0.04909	43.7	3.06		2.87	3.24	
0.28	0.06158	54.8	2.44		2.29	2.58	
0.30	0.07069	62.9	2.12		1.99	2.25	
0.315	0.07793	69.4	1.92		1.83	2.02	
0.35	0.09621	85.6	1.56	± 5 %	1.48	1.64	
0.355	0.09898	88.1	1.52		1.44	1.59	
0.40	0.1257	112	1.19		1.13	1.25	
0.45	0.1590	142	0.943		0.896	0.990	
0.50	0.1963	175	0.764		0.726	0.802	
0.55	0.2376	211	0.631		± 4 %	0.606	0.657
0.56	0.2463	219	0.609			0.585	0.633
0.60	0.2827	252	0.531	0.509		0.552	
0.63	0.3117	277	0.481	0.462		0.500	
0.65	0.3318	295	0.452	0.434		0.470	
0.70	0.3848	343	0.390	0.374		0.405	
0.71	0.3959	352	0.379	0.364		0.394	
0.80	0.5027	447	0.298	0.286		0.310	
0.90	0.6362	566	0.236	0.226		0.245	
1.0	0.7854	699	0.191	0.183		0.199	
1.12	0.9852	877	0.152	0.146		0.158	
1.2	1.131	1007	0.133	0.127		0.138	
1.25	1.227	1092	0.122	0.117		0.127	
1.4	1.539	1370	0.0974	0.0935		0.101	
1.5	1.767	1573	0.0849	0.0815		0.0883	
1.6	2.011	1790	0.0746	0.0716		0.0776	
1.8	2.545	2265	0.0589	0.0566		0.0613	
2.0	3.142	2796	0.0477	0.0458		0.0497	
2.2	3.801	3383	0.0395	0.0379		0.0410	
2.24	3.941	3507	0.0381	0.0365		0.0396	
2.5	4.909	4369	0.0306	0.0293		0.0318	
2.8	6.158	5480	0.0244	0.0234		0.0253	
3.0	7.069	6291	0.0212	0.0204		0.0221	
3.15	7.793	6936	0.0192	0.0185		0.0200	
3.2	8.042	7158	0.0187	0.0179		0.0194	
3.5	9.621	8563	0.0156	0.0150		0.0162	
3.55	9.898	8809	0.0152	0.0145		0.0158	
4.0	12.57	11184	0.0119	0.0115		0.0124	
4.5	15.90	14155	0.00943	0.00905	0.00981		
5.0	19.63	17475	0.00764	0.00733	0.00795		
5.5	23.76	21145	0.00631	0.00606	0.00657		
5.6	24.63	21921	0.00609	0.00585	0.00633		
6.0	28.27	25164	0.00531	0.00509	0.00552		
6.3	31.17	27744	0.00481	0.00462	0.00500		
8.0	50.27	44736	0.00298	0.00286	0.00310		