



Wooden mounting rig with metre ruler attached Voltmeter

Electrodes (with electrically insulated handles) Digital calliper (for measuring wire diameter)





Place the wire between the jaws of the digital calliper to measure the diameter.

Don't forget to zero the calliper (when closed) first!

I measured:

$$d = (0.29 \pm 0.1) \,\mathrm{mm}$$

Measure the potential difference between a fixed separation of wire. Using two electrodes connected to the voltmeter

DC

OFF

Note if you use a single electrode, you need to be careful about the contact resistance of the rest of the circuit. So using two electrodes is preferable. A cylindrical passive resistor of crosssection A and length l will have resistance R in terms of these geometrical parameters and the *resistivity* ρ of the material.

$$R = \frac{\rho l}{A}$$

1

R

https://hypertextbook.com/facts/2006/UmranUgur.shtml

Bibliographic Entry	Result (w/surrounding text)	Standardized Result
C. Weast, Robert. <i>Handbook of Chemistry and of Physics- 48th Edition</i> . Ohio: The Chemical Rubber Co., 1968: F-130.	"Steel, piano wire (0 °C): Resistivity = 11.8 × 10 ⁻⁶ Ωcm"	1.18 × 10 ^{−7} Ωm
R. Lide, David. <i>Handbook of Chemistry and of</i> <i>Physics- 75h Edition.</i> London: The Chemical Rubber Co., 1995: 12-185.	[see table 1 below]	7.2 × 10 ⁻⁷ Ωm
Conductivity of Metals Sorted by Resistivity. Eddy Current Technology Incorporated.1955.	[see table 2 below]	$\frac{1.644}{7.496} \times 10^{-7} \Omega^{-1}$
Resistance and Resistivity. School Science.	"Steel (varies): 10 to 100 × $10^{-8} \Omega m$ "	1 to 10 × 10 ⁻⁷ Ωm



K=P

If we plot V vs d then we should get a straight line from the origin. From the *gradient* we can find the **resistivity** ρ .

V = k lSo if れこ j2 πd S

RESITIVITY OF A WIRE

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wire length			1.6
between			
electrodes /cm	Voltage /volts	L/m	1.4
5	0.084	0.05	
10	0.165	0.1	y = 1.6105x
15	0.25	0.15	$R^2 = 0.9989$
20	0.333	0.2	
25	0.417	0.25	
30	0.5	0.3	9.8 0.8
35	0.582	0.35	
40	0.631	0.4	
45	0.707	0.45	
50	0.786	0.5	0.4
55	0.884	0.55	
60	0.955	0.6	0.2
65	1.052	0.65	
70	1.147	0.7	
75	1.22	0.75	0 0.2 0.4 0.6 0.8 1
80	1.29	0.8	wire length /m
85	1.35	0.85	









"Steel (varies): 10 to 100 × $10^{-8} \Omega m$ "

1 to 10 × 10^{-7} Ωm