



Cambridge Instruments
& Engg. Co.

EST. 1963 · HOWRAH, INDIA

TEST REPORT FORM

Earth Electrode Resistance Test

Fall-of-potential method · 62 % rule with 52 / 62 / 72 % plateau check

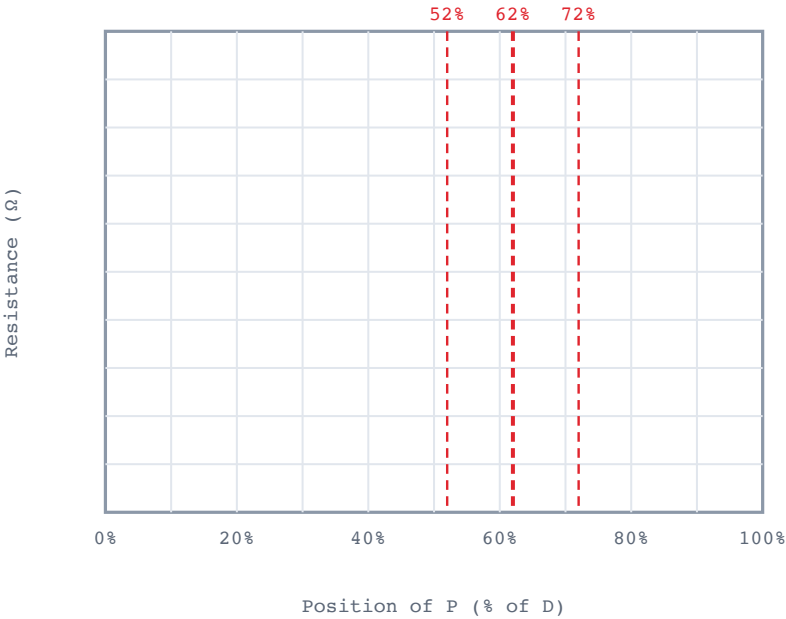
01 Job and test details

Customer / site	Electrode ID / tag	Test date
Electrode type and description	Largest dimension of electrode L (m)	Distance E to C spike: D (m)
Soil condition ☐ Dry ☐ Damp ☐ Wet	Permitted earth resistance (Ω)	Seasonal factor (default 1.0)
Test instrument, serial no.	Tested by	Calibration due

02 Readings along the line from E to C

keep E and C fixed, move P in steps

P position % of D	P distance metres = % $\times$ D	Reading R Ω
10%		
20%		
30%		
40%		
50%		
52%		
62%		
72%		
80%		
90%		



The three shaded rows are the plateau check. Plot your readings on the graph: a flat region around 62 % means a good test.

03 Result

R at 52 % _____	R at 62 % _____	R at 72 % _____	Largest difference from R62 $\max(R52-R62 , R72-R62)/R62$ _____
Plateau check (agree within 5 %) ☐ Valid ☐ Not valid		D at least 5 $\times$ L ☐ Yes ☐ No	
Earth resistance = R62 $\times$ factor _____		Against permitted value ☐ PASS ☐ FAIL	
Remarks and recommended action _____			

Signature and date: tester _____	Signature and date: reviewer _____
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WORKSHEET AND REFERENCE

Soil resistivity and rod estimate

Wenner four-pin method, depth correction and a single-rod resistance estimate for comparison

01 Wenner soil resistivity survey

Traverse direction and location

Probe depth b (m)

Test date

Spacing a metres	Reading R Ω	b / a b divided by a	Simple resistivity $2\pi a R$	Factor F from table	Corrected resistivity simple $\times F$, $\Omega \cdot m$

Average ρ corrected ($\Omega \cdot m$)

Lowest and highest ($\Omega \cdot m$)

02 Depth correction factor F

F depends only on b / a

b / a	0.01	0.02	0.05	0.10	0.15	0.20	0.30
Factor F	1.0002	1.0007	1.0044	1.0172	1.0380	1.0659	1.1382

Exact Wenner relation: $\rho = 4\pi a R / (1 + 2a / \sqrt{a^2 + 4b^2} - a / \sqrt{a^2 + b^2})$, which equals $2\pi a R \times F$ with $F = 2 / (1 + 2 / \sqrt{1 + 4(b/a)^2} - 1 / \sqrt{1 + (b/a)^2})$. For b much smaller than a, F is close to 1. Apparent resistivity at spacing a reflects soil to a depth of the order of a. A strong change with spacing suggests layered soil.

03 Single vertical rod estimate

for comparison with your measurement

Resistivity ρ ($\Omega \cdot m$)

Rod length in soil L (m)

Rod radius r (m)
diameter / 2

Estimated R (Ω)

Dwight formula
 $R = \rho / (2\pi L) \times (\ln(4L / r) - 1)$

Worked example (made-up numbers)
 $\rho = 60, L = 3 \text{ m}, 16 \text{ mm rod: } R = 20.1 \Omega$

An estimate for one vertical rod in uniform soil. A difference of tens of percent from the measurement is common. A large difference points to layered soil, rock, moisture or interference worth investigating.

04 Method notes

- Keep the P and C spikes in line with the electrode, away from buried pipes and cables, and in undisturbed soil. If the three readings at 52, 62 and 72 % do not agree, increase D and repeat.
- Earth resistance changes with season and soil moisture. Record the soil condition and last rainfall, and set the seasonal factor from your site or utility practice.
- Limits and constants: IEEE 81-2012 (fall-of-potential and Wenner methods) and the Dwight rod formula. The 5 % plateau tolerance and $5 \times L$ spacing are practical guides, not limits from a standard.

CIE INSTRUMENTS FOR THIS TEST

DET-2000

Digital earth resistance tester, 4-terminal, rechargeable battery

CIE/222M

Analog hand-driven earth tester, 3-terminal and 4-terminal (soil resistivity)



Check it online

Scan for the free soil resistivity calculator.
cieinstruments.in/tools



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Page 2 of 2 · Calculation aid, not a substitute for the standard or your site procedure

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