EARTH RODS, THE DEVIATION CALCULATION, AND RA

80, 82 AND 84 OHMS. WHAT'S THE DEVIATION?

EARTH RODS, AND THE THREE METHODS AGAIN

The rod itself is a threaded bar driven into the ground with a cover at the top. It can be as long as it needs to be — one metre, two, five — and rods can be **coupled together** to go deeper.

> **Soil decides.**
> Hard ground that still needs a TT system may mean driving in several.

METHOD	IN A SENTENCE
E1	The most accurate — and hard graft in difficult soil
E2	More accurate if there are a number of earth electrodes; the clamp needs at least one other earth path
E3	An earth fault loop impedance test. The easiest, and the one you will do — but it may not be as accurate as a dedicated earth electrode tester

> **Easiest is not most accurate.**
> E3 being the common choice does not make it better than E1.

THE DEVIATION CALCULATION

Guidance Note 3 · p.79 . This is the step after it, and it is the part that gets skipped.

THREE READINGS: 64, 62.5 AND 65.3 Ω

Step 1 — the average
64 + 62.5 + 65.3 = 191.8
191.8 ÷ 3 = **63.93 Ω**

> ✋ **If you got 191.8, you forgot to divide by three.** An average is the total divided by how many readings you took.

STEP 2 — THE PERCENTAGE DEVIATION

Find the reading **furthest from the average.**
Here that is 62.5 (1.43 below), not 65.3 (1.37 above):

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63.93 - 62.5   = 1.43
1.43 ÷ 63.93   = 0.0224
0.0224 × 100   = 2.24% → 2.2%
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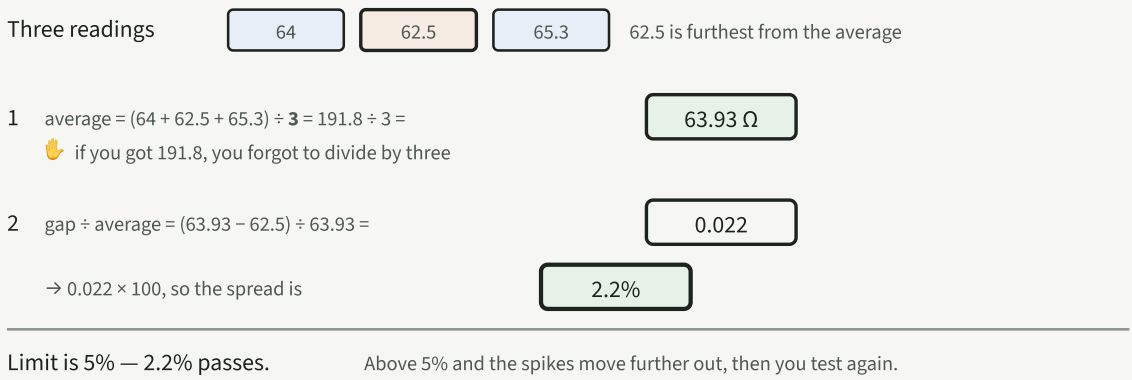
STEP 3 — THE 1.2 FACTOR

Guidance Note 3: the accuracy of a method E1 measurement is typically **1.2 ×** the percentage deviation you calculated.

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2.24% × 1.2 = 2.69% → 2.7%
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Which reading will be highest, and why.

Test 1 is taken at the centre. Test 2 moves the voltage spike **towards** the electrode by 10% of the full electrode-to-current-spike distance (current spike at 30 m: move 3 m), so you expect a **lower** resistance. Test 3 moves it the same distance the other way, so you expect a slightly **higher** one — which is usually your highest figure.



This is the step after it, and it is the one people skip — the average on its own tells you nothing about whether the three readings agreed.

RA: THE ELECTRODE RESULT, AND WHERE IT GOES

Method E1 gives you an $\mathbf{R_A}$ result — unless it has been handed to you as a Z_e, in which case take it as R_A.

> R_A = the electrode plus the earthing conductor back to the MET

A SECOND WORKED DEVIATION, WITH CLEANER NUMBERS

Readings: 80, 82, 84 Ω

Average = 246 ÷ 3 = **82 Ω**
Furthest = 80 and 84, both 2 away
Deviation = 2 ÷ 82 = 0.024 → **2.4%**

Always use the reading **furthest from the average.**

Where it goes on the EIC.

On page 2, tick **earth electrode** as the means of earthing and **TT** as the nature of earthing, name the electrode (earth rod, copper rod), and find the field marked **R_A or Z_e** — cross out the one that does not apply and write your value in.

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