R1 + R2 OF A RING FINAL CIRCUIT

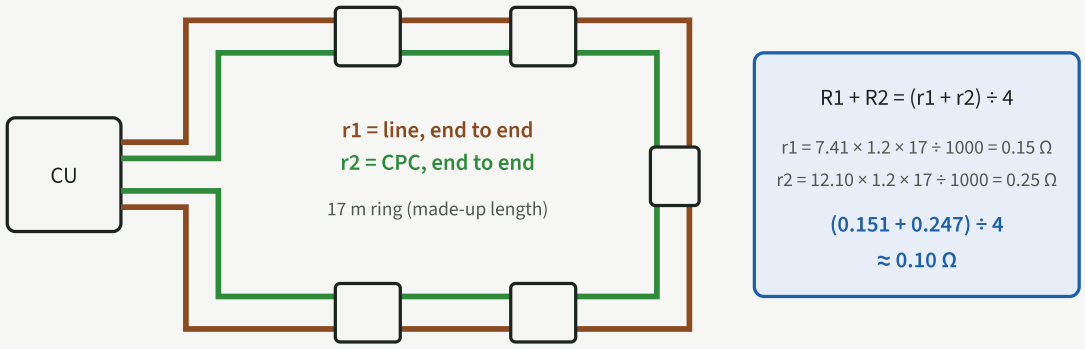
WHY DIVIDE A RING BY FOUR?

What it's for: the same design check, for a ring final circuit. Rings are "a weird bunch". The two legs make parallel paths, so you think about them differently.

`Ring R1 + R2 = (r1 + r2) ÷ 4`

r1 = end-to-end resistance of the ring's line conductor · r2 = end-to-end resistance of the ring's CPC · each r = (B1 × B3 × L) ÷ 1000

The lower-case **r** means the resistance of **one conductor** from end to end. For those you use Table B1 for a conductor **on its own**. That's the rows with a **dash** in the second column (e.g. "2.5 –"). Sparky's tip: ignore the column headings "line conductor" and "protective conductor". A 2.5 mm² conductor on its own is **7.41 mΩ/m** whatever it's used for.



A ring's line and CPC each form a loop that starts and ends at the consumer unit. r1 and r2 are those loops measured end to end. Dividing by 4 gives the R1 + R2 you'd expect at each socket once the ring's ends are cross-connected (step 3 of the ring test).

WORKED EXAMPLE: 2.5/1.5 MM² TWIN AND EARTH RING, 17 M

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Table B3 = 1.2 (70 °C thermoplastic T&E).

r1 (2.5 mm² on its own, Table B1 = 7.41 mΩ/m)
   = (7.41 × 1.2 × 17) ÷ 1000 = 0.151 ≈ 0.15 Ω

r2 (1.5 mm² on its own, Table B1 = 12.10 mΩ/m)
   = (12.10 × 1.2 × 17) ÷ 1000 = 0.247 ≈ 0.25 Ω
   (higher than r1: smaller CSA → more resistance)

R1 + R2 = (r1 + r2) ÷ 4
        = (0.151 + 0.247) ÷ 4
        = 0.398 ÷ 4
        = 0.0995 ≈ 0.10 Ω
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> **Rounding note**
>
> If you round r2 down to **0.24 Ω** you get (0.15 + 0.24) ÷ 4 = 0.0975 Ω, and if you then cut that short you'd write **0.09 Ω**. Keeping the unrounded values gives **0.0995 ≈ 0.10 Ω**. The difference is only rounding, but it's a good habit to keep the full numbers in your calculator until the last step.

Why ÷ 4? Once the ends are cross-connected, the loop splits into **two parallel halves**, each half the loop's resistance. Two equal halves in parallel give half of a half: a **quarter**. If that's unclear, rewatch your initial verification lessons. The inspector later measures this during **step 3 of the ring final test** and checks it against their own calculation.

You could equally use **Tables I1 and I3** (On-Site Guide Appendix I) or **Tables F1 and F3** (Electrical Installation Design Guide). They're the same tables. Some would say GN3's Table B1 is an inspection table and shouldn't be used for design. That's fair, but it's the book you're all familiar with.

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