CABLE CALCULATION, STEP 14: THE ADIABATIC CHECK ON THE CPC

WILL THE CPC SURVIVE UNTIL THE DEVICE TRIPS?

$$S = \sqrt{(I^2 \times t)} \div k$$

S = minimum CPC size (mm²) · **I** = fault current (A) · **t** = disconnection time (s) · **k** = a factor for the conductor and insulation material and temperatures

k comes from Chapter 54, Tables 54.2 to 54.6. Ours is **Table 54.3**: a protective conductor **incorporated in a cable or bunched** with cables, initial temperature 70 °C or more. For **70 °C thermoplastic, copper: k = 115**. The starred 103 is for conductors **over 300 mm²**. Ours is 6 mm², so 115.

WORKING

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S = √(550.4² × 0.1) ÷ 115
  = √30 294 ÷ 115
  = 174.1 ÷ 115
  = 1.51 mm²

The CPC of the designed circuit is 6 mm².
Chapter 54 minimum allowable is 1.51 mm².  6 mm² ≥ 1.51 mm² ✓
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BS 7671 · Chapter 54 · Tables 54.2–54.6 · values of k

BS 7671 · Table 54.3 · k for a CPC in a cable or bunched (70 °C thermoplastic copper = 115)

That's the design finished. It works in normal use, and in a fault the protective device will operate before the CPC is damaged.

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