WORKED EXAMPLE: SHOWER WITH FACTORS

35 DEGREES AND GROUPED WITH TWO OTHERS. WHAT CABLE NOW?

THE SHOWER QUESTION, WITH FACTORS ADDED

8.5 kW shower · domestic · flat T&E · reference method 102 · 20 m run
BS EN 60898 circuit breaker
NEW: ambient temperature 35 °C · grouped with 2 OTHER circuits (3 in total)

WORKING

```
1) Ib = P ÷ V = 8500 ÷ 230 = 36.96 A
2) In = 40 A Type B          (Ib ≤ In ✓)

3) Correction factors
   Ca (70 °C thermoplastic, 35 °C)        = 0.94
   Cg (3 circuits, bunched/enclosed)       = 0.70

4) It needed = In ÷ (Ca × Cg) = 40 ÷ (0.94 × 0.70) = 60.79 A

5-6) T&E, method 102, need It ≥ 60.79 A
   10 mm² → 47 A  ✗
   16 mm² → 63 A  ✓  → 16 mm² twin and earth

7) Voltage drop: 16 mm² → 2.8 mV/A/m (max 5% = 11.5 V)
   VD = (2.8 × 36.96 × 20) ÷ 1000 = 2.07 V ✓

Answer: 16 mm² T&E on a 40 A Type B.
(Without the factors it was 10 mm².)
```

Remember `Ib ≤ In ≤ Iz`, where Iz = It × the factors. You **don't** make the protective device bigger to fix it. You **upsize the cable**, because the device must still operate before the cable overheats.

If it still fails

Flat twin and earth only goes up to **16 mm²**. If 16 mm² doesn't pass, **re-route** the cable (for example, away from insulation or other circuits) or use a **different type** of cable.

BS 7671 · Appendix 4 · Table 4D5 70 °C flat T&E (It and mV/A/m) · **p.484**

On-Site Guide · Table F6 (same values, handier) · **p.193**

Electrician's Guide to the Building Regs · T&E current ratings table by reference method · **p.41**

VOLTAGE DROP LIMITS IN BS 7671

BS 7671 · Appendix 4 · Table 4Ab voltage drop: 3% lighting, 5% other uses · **p.458**

THE ON-SITE GUIDE SETS OUT THE VD FORMULA AS ÷1000 (RADIAL) AND ÷4000 (RING). LEARN IT FOR THE 18TH EDITION EXAM.

EXTRA: THE LARGEST MV/A/M YOU CAN USE (FOR INTEREST ONLY)

```
max mV/A/m = (max VD × 1000) ÷ (Ib × L)
           = (11.5 × 1000) ÷ (36.96 × 20) = 15.56 mV/A/m
→ any cable at or below 15.56 mV/A/m passes volt drop on this run.
You won't be asked to do this in the exam. You'll pick the value from the tab
```

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