CABLE SELECTION: THE 7 STEPS

FROM THE LOAD TO THE CABLE SIZE. SEVEN STEPS. KNOW THEM?

1. **Work out the design current, Ib.** `Ib = P ÷ V`. Also note the **installation reference method** now, from the question.
2. **Select the protective device rating, In** (e.g. B40), so that In ≥ Ib.
3. **Identify the installation method** (C, B, A, 100–103…).
4. **Apply any correction factors**, e.g. ambient temperature, grouping or thermal insulation.
5. **Calculate the tabulated current, It**, that the cable must be able to carry.
6. **Select the cable size** from the tables (BS 7671 or the On-Site Guide).
7. **Check the voltage drop.**

Ib	**Design current** of the circuit: the load. "Ib", not "ID".
In	**Nominal rating of the protective device** in amps, e.g. the "6" on a B6.
Iz	**Current-carrying capacity** of the cable under normal conditions **once correction factors have been applied**. The Z here has nothing to do with impedance.
It	**Tabulated current-carrying capacity**: the value straight from the tables.

$$Ib \leq In \leq Iz$$

With no correction factors, Iz = It, so you pick a cable whose tabulated rating It ≥ In.

VOLTAGE DROP: RADIAL CIRCUITS

```
VD = (mV/A/m × Ib × L) ÷ 1000

÷1000 because mV/A/m is in millivolt
```

VOLTAGE DROP: RING FINAL CIRCUITS

```
VD = (mV/A/m × Ib × L) ÷ 4000

÷4000: the ring is two legs in paral
each about half the length to the lo
so the drop is ½ × ½ = ¼ of a radial
(mV/A/m already covers line + neutra
```

MAX VOLTAGE DROP	SINGLE-PHASE 230 V	THREE-PHASE 400 V
Lighting: **3%**	6.9 V	12 V
All other circuits (sockets, showers, cookers): **5%**	11.5 V	20 V

The 3% and 5% are measured from the **origin of the installation**, not from the consumer unit a circuit happens to start at. If the voltage drop is too high, **upsize** the cable. You never downsize.

> **On-Site Guide** · Appendix F: voltage drop explanation, radial formula and ring formula · **p.184**

HIGHLIGHT THE FORMULA AND THE 3% / 5% PARAGRAPH

> **In real life**
> On most jobs a designer, your boss or the company has already done these calculations, and you install to the design. You still need to know the method for the exam. Higher-level design qualifications take it much further.

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