THE SYMBOLS YOU NEED COLD

IB, IN, IZ, IT. WHICH IS WHICH?

I_2 AND THE 1.45 FACTOR

A second formula worth knowing, from **Reg 433.1.1(c)** (p.103), and it explains a number people meet without understanding.

$$I_2 \leq 1.45 \times I_Z$$

I_2 = the current that ensures effective operation of the device · **1.45** is a factor, not a current

For a **circuit breaker**, I_2 is **1.45 × I_n**: the current at which it is sure to operate within the conventional time. On the Appendix 3 curve that sits in the slow thermal (overload) region, not the instantaneous part. So once $I_n \leq I_Z$, a circuit breaker meets $I_2 \leq 1.45 \times I_Z$ automatically.

```
A 6 A TYPE B LIGHTING BREAKER

Effective operation:  1.45 × 6  = 8.7 A
  → sure to trip, within the conventional time

Instantaneous trip:   5 × 6     = 30 A
  → operates within 0.1 s

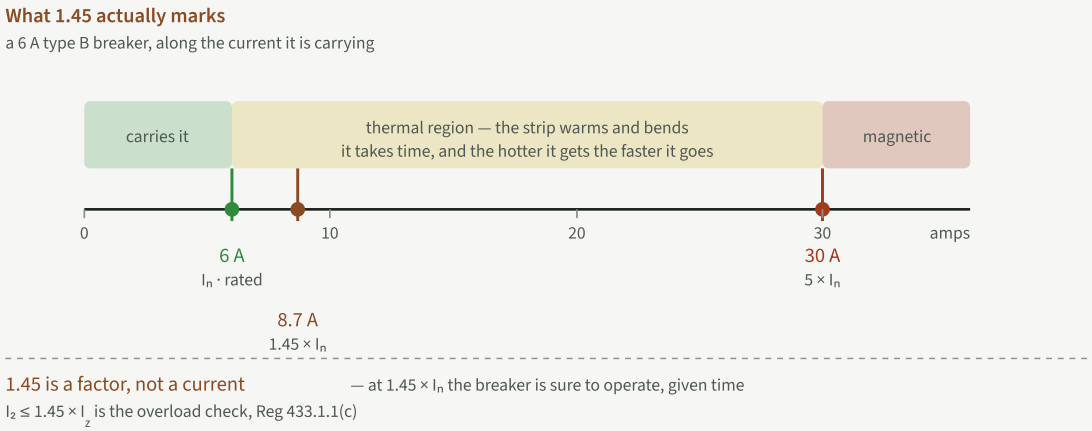
A lighting circuit normally draws 2–3 A,
so 8.7 A is a long way above normal use.
```

! For a **BS 3036 semi-enclosed rewireable fuse** the rating factor is **0.725** — exactly half of 1.45, because a rewireable fuse needs about **twice** its rating to operate in the conventional time. Different device, very different behaviour.

Overload versus fault, on one graph.

The long sweeping curve is the **overload** region — a modest excess can take a very long time to trip. The straight vertical part at the bottom is the **fault** region, where a big current trips it almost instantly.

433.1.1(c) · p.103 · $I_2 \leq 1.45 \times I_Z$ **Appendix 3** · Figure 3A4



At its rated 6 A the breaker carries current all day. At **8.7 A** — 1.45 times the rating — the breaker is **sure to operate**, but only within the conventional time, not instantly; the further above it you go, the quicker it operates. Only at **30 A**, five times the rating, does the magnetic trip act instantly. People meet 1.45 as if it were an instant trip current; it is the factor that gives I_2, the current ensuring effective operation.

THE SYMBOLS YOU NEED COLD

Make sure you know these, and highlight them in the abbreviations list towards the end of Part 2.

SYMBOL	MEANS	WHERE IT COMES FROM
I_b	Design current	Calculated from the load: P ÷ V
I_n	Nominal rating of the protective device	Chosen so $I_b \leq I_n$
I_z	Current-carrying capacity of the cable *in its installed conditions*	I_t × the correction factors
I_t	**Tabulated** current-carrying capacity	Read from the Appendix 4 tables
I_2	Current ensuring effective operation of the device	1.45 × I_n for a circuit breaker · must not exceed 1.45 × I_z
I_a	Current causing automatic operation in time	5 × I_n for a type B

≤ The chain that ties them together: **$I_b \leq I_n \leq I_z$**, where $I_z = I_t$ × the factors — so you need **$I_t \geq I_n$ ÷ the factors**. Get that order straight and most cable-design questions unlock.

Part 2 · symbols (pp.52–53) and abbreviated terms (pp.54–55), at the end of the part

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