WHERE 0.87 Ω COMES FROM

WHERE DOES THE 0.87 OHM IN TABLE 41.3 COME FROM?

WHERE 0.87 Ω ACTUALLY COMES FROM

Table 41.3 gives a 50 A type B breaker a maximum Zs of **0.87 Ω**, so where does that number come from? It isn't arbitrary — it's calculated, and the formula is printed in the book at **Reg 411.4.4** (p.73) as $Zs \times I_a \leq U_o \times C_{min}$, and again at **411.5.4**, under Table 41.5 (p.77). Rearranged, it reads:

$$Zs \leq (U_o \times C_{min}) \div I_a$$

U_o = nominal voltage to earth, 230 V · C_{min} = 0.95 · I_a = the current that operates the device in the required time

```
PROVING THE 0.87 Ω FOR A 50 A TYPE B

Ia for a type B = 5 × In
Ia = 5 × 50 = 250 A

Zs ≤ (230 × 0.95) ÷ 250
Zs ≤ 218.5 ÷ 250
Zs ≤ 0.874 Ω

Table 41.3 says 0.87 Ω. Same number.
```

C_{min} is 0.95 and it's the **minimum voltage factor**, defined at 411.4.4 to take account of voltage variations; Note 1 there gives 0.95 for low voltage supplies. Don't lose sleep over where 0.95 came from — it's a given value — accept it and move on.

> **You will not have to do this in the job.**
> A designer works these out; an installer or tester works to the **80 % measured value** instead. It's here so the tables stop looking like magic.

411.4.4 · p.73 · $Zs \times I_a \leq U_o \times C_{min}$

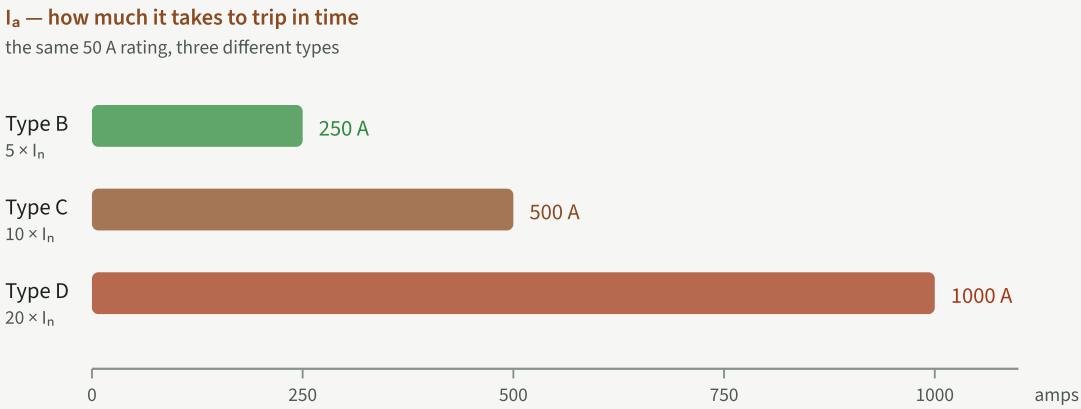
411.5.4 · under Table 41.5 · p.77

411.4.4 · Note 1 · $C_{min} = 0.95$

IA: THE CURRENT THAT TRIPS THE DEVICE

The book defines I_a as the **current causing automatic operation of the protective device** within the required disconnection time. In plain terms: how much fault current it takes to make it trip in time, which is what achieves ADS.

BREAKER TYPE	I_A	50 A EXAMPLE
Type B	$5 \times I_n$	250 A
Type C	$10 \times I_n$	500 A
Type D	$20 \times I_n$	1000 A



Same 50 A rating, four times the fault current between a type B and a type D — which is why the type matters as much as the size. If the loop impedance cannot deliver that current, the device will not disconnect in time and ADS is not achieved.

You can also read I_a straight off **Appendix 3**. It prints, with each set of time/current curves, a table of the currents needed for operation between 0.1 s and 5 s — those figures *are* the I_a values. For a type B the tabulated figure is simply five times the rating.

≡ So the three ideas connect: **I_a** is how much current it takes to trip · **Zs** decides how much current can actually flow · if Zs is low enough, the fault current reaches I_a and **ADS happens**.

Appendix 3 · Figure 3A4 · time/current curves and the operating-current tables

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