CHECKING ZS AGAINST THE TABLE, AND WHERE 2.19 COMES FROM

WHY MULTIPLY THE TABLE BY 0.8?

THE WORKED EXAMPLE

System = TN-S Max Z_e for TN-S = 0.8 Ω

Z_e measured = 0.42 Ω → comfortably inside

$R_1 + R_2$ = 0.36 Ω

$Z_s = 0.42 + 0.36 = \mathbf{0.78\ \Omega}$

Now check it. **BS 7671** · Table 41.3 · p.75 gives the **maximum tabulated** Z_s.

For a **20 A Type B** circuit breaker to BS EN 60898 that is **2.19 Ω**.

WHERE 2.19 Ω ACTUALLY COMES FROM

$$Z_s = (U_o \times C_{min}) \div I_a$$

U_o = 230 V

C_{min} = **0.95** (the minimum voltage factor, for voltage variations)

I_a = 5 × I_n for Type B = 5 × 20 = **100 A**

$Z_s = (230 \times 0.95) \div 100$

$= 218.5 \div 100$

$= 2.185 \rightarrow$ **2.19 Ω**

The formula is printed in the regulations

as $Z_s \times I_a \leq U_0 \times C_{min}$:

BS 7671

· Reg 411.4.4 · p.73, and again at Reg 411.5.4 under Table 41.5 on p.77. You are not expected to derive it in the exam — but knowing where the number comes from stops you reaching for the wrong row.

Then apply the **80% rule** to get a maximum **measured** value:

THE 80% CHECK

80% of 2.19 Ω = **1.75 Ω**

Our calculated Z_s = 0.78 Ω → well inside. Pass.

✋ **Why 80%?** The table assumes the conductors are at **operating temperature**. Your test circuit is cold. Once the circuit is in use the current warms the cable and the resistance rises, so the measured figure has to sit below the tabulated one.

The 80% figures are printed too.

Check against ☐

On-Site Guide

· Table B6 .

TN-S · 20 A Type B circuit breaker

Z_e measured	0.42	max for TN-S is 0.8 Ω — comfortably inside
$R_1 + R_2$	0.36	
Z_s = 0.78 Ω	0.78	
PASS — well under	maximum tabulated Z_s = 2.19 Ω	Table 41.3

2.19 Ω is not arbitrary: $Z_s = (U_o \times Cmin) \div I_a = (230 \times 0.95) \div (5 \times 20)$ for a 20 A Type B.

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