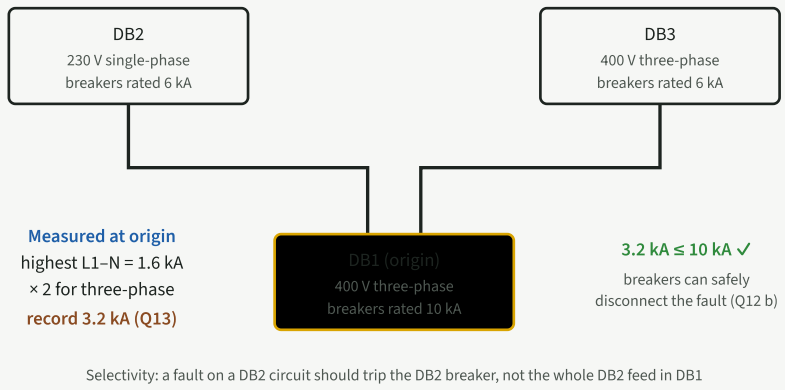
PROSPECTIVE FAULT CURRENT: A THREE-PHASE SCENARIO

1.6 KA BETWEEN L1 AND NEUTRAL. WHAT DO YOU RECORD?

The scenario for Q12 to Q14 During initial verification of a three-phase installation, the highest prospective fault current reading at the origin is **1.6 kA**, between L1 and neutral. **DB1** at the origin is 400 V three-phase with circuit breakers rated **10 kA**. It feeds **DB2** (230 V single-phase, breakers rated **6 kA**) and **DB3** (400 V three-phase, breakers rated **6 kA**).

Prospective fault current (I_{pf}) is the **higher** of the prospective earth fault current (PEFC) and the prospective short-circuit current (PSCC).



The scenario redrawn. Ipf is measured at the origin and compared with the breaking capacity of the devices.

Q12Elimination + book
What is this test for?

1. **a**Checking the distribution circuits are selective
2. **b**Checking the protective devices can safely clear a fault within the installation
3. **c**Checking the DNO's service fuse disconnects within 5 seconds
4. **d**Checking the main switch can switch short-circuit currents

- **c is out**: the DNO's service fuse belongs to the DNO. It's **outside the scope of BS 7671**. Any disconnection rules for it come from the supply regulations, not ours.
- **d is out**: the main switch is an **isolator**. Nobody switches it off during a short circuit. By the time you'd reach it, the protective device has already operated.
- **a** is arguable. "Discrimination" is now called **selectivity**: the device **nearest the fault** operates first. For example, a heater fault on a DB2 circuit should trip that circuit in DB2, not the DB2 feed in DB1, which would kill every circuit in DB2. The test does relate to this, but b is better.

- **b is the best answer**, and it's the **safety** answer. Each device has a breaking capacity, which is the most fault current it can clear safely.

Take a **B20** circuit breaker. In a small rectangle under the rating it's marked **10000**. That's its **I_{cn}** in amps. If a fault current is above that, the breaker may **not clear it safely**. It could explode, catch fire or weld its contacts.

> **Watch out: I_{cn} and I_{cs}**A common mix-up is to call the "maximum before safety is lost" the I_{cs}. That's actually **I_{cn}**, the **rated short-circuit capacity** printed on the breaker (10 kA here). The device can break it safely but might not be fit to use afterwards. **I_{cs}** is the **service short-circuit capacity**: the fault current it can break and still stay in service. I_{cs} is equal to or **lower** than I_{cn}.

> **Watch out: ESQCR**ESQCR is the **Electricity Safety, Quality and Continuity Regulations** 2002, which cover the DNO's side.

> **Two answers both look possible?**
> If you find yourself thinking "it could be this or that", it is usually a sign you need more knowledge of the subject. Until then, the **safety** answer is the better guess.

GN3 · 2.6.16 prospective fault current · **p.88**

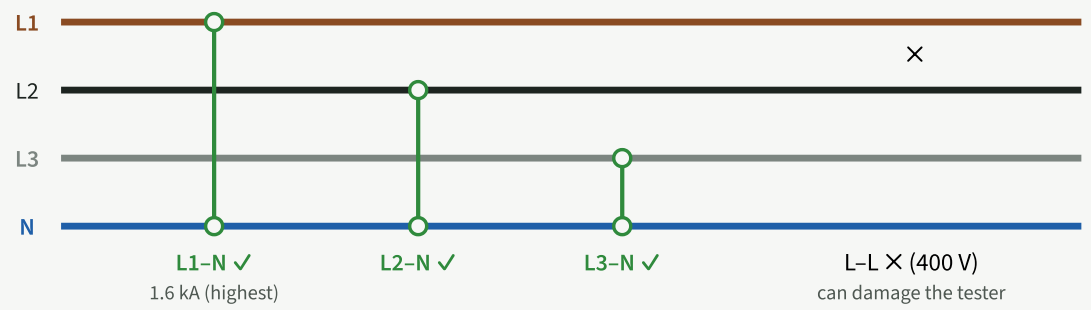
GN3 · I_{cn} and I_{cs} short-circuit capacities

`READ 2.6.14, 2.6.15 AND 2.6.16 TOGETHER AND SUMMARISE THEM IN YOUR OWN WORDS`

Q13Book
The highest reading was 1.6 kA, between L1 and neutral. What goes on the certificate?

1. **a**3.2 kA
2. **b**1.6 kA
3. **c**1600 kA
4. **d**3200 kA

Answer a: 3.2 kA. The EIC's **nature of supply parameters** box has I_{pf}, just above Z_e. On three-phase, the worst short circuit is **between lines**. But many testers would be **damaged by 400 V** across them. So, as the book says, test **L1–N, L2–N and L3–N** (230 V each), take the **highest** and **double it**.



Highest L–N reading × 2 = Ipf to record · 1.6 kA × 2 = 3.2 kA

Measure each phase to neutral, never line to line with a tester that isn't made for it. Then double the highest reading.

Watch the units

"1600 kA" is 1600 × 1000 A, which is **1,600,000 A**. It's like saying "sixteen hundred thousand pounds". Don't be lured by options c and d.

GN3 · Section 5 · EIC · nature of supply parameters (I_{pf}, above Z_e) · example EIC **pp.147–149**

GN3 · 2.6.16 · three-phase: measure L–N, double the highest · **p.88**

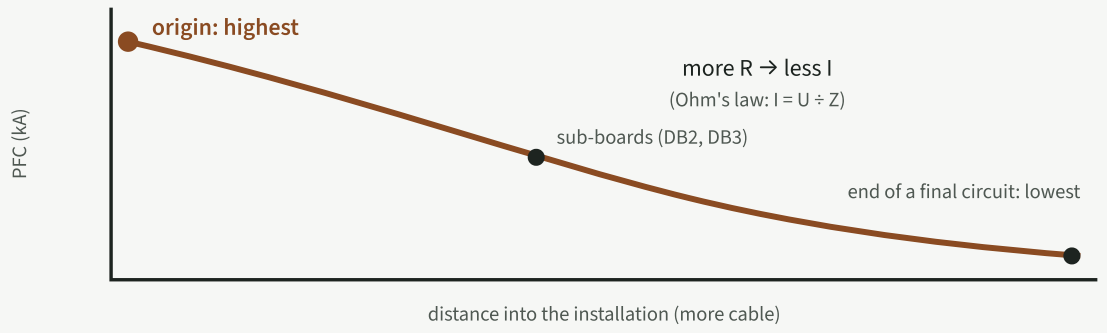
HIGHLIGHT THIS PARAGRAPH

Q14Knowledge

What happens to prospective fault current the further into the installation you measure?

1. **a**It rises, because resistance falls
2. **b**It falls, because resistance falls
3. **c**It rises, because resistance rises
4. **d**It falls, because resistance rises

Answer d. It's not in the book, it's just **Ohm's law**. More cable means more resistance, and more resistance means less current. So PFC is **highest at the origin**, which is why you measure it there.



The shape only, not to scale. PFC falls as you move away from the origin.

Free section from Sparky Study Notes. The full Level 3 notes, 1,463 practice questions and the video lessons: sparkystudynotes.co.uk