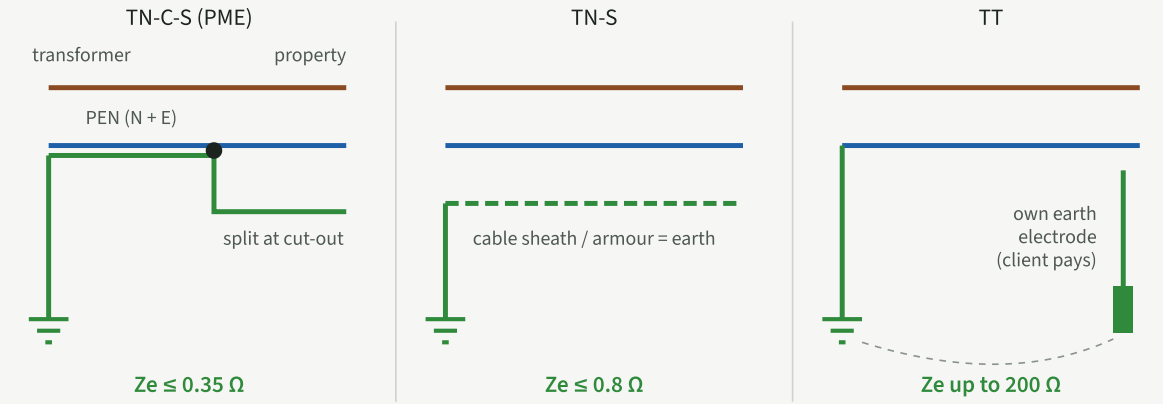
EARTHING SYSTEMS: TN-C-S, TN-S, TT

TN-C-S, TN-S, TT. WHAT DO THE LETTERS MEAN?

Reading the letters: T = *Terra* (earth) · N = *Neutral* · C = *Combined* · S = *Separate*.

SYSTEM	HOW THE EARTH IS PROVIDED	EXPECTED MAX ZE	WHERE YOU'LL FIND IT
TN-C-S also called PME	Neutral and earth are **combined** in the supply cable (PEN conductor), then **separated** at the cut-out. PME = protective multiple earthing, with many earth connections along the network. Provided by the DNO.	0.35 Ω	Most new builds and most homes today
TN-S	Earth and neutral are **separate** all the way. The earth is the **metal sheath or armour** of the supply cable, clamped and taken to the MET. Provided by the DNO.	0.8 Ω	Older properties
TT	No earth from the DNO. The installation has its own **earth electrode** (rod or plate) in the ground. **The client pays for it**, and you install it.	up to 200 Ω	Rural areas, farms, caravan parks and other places too far from a transformer's star point



Simplified. The transformer's star point is on the left of each drawing and the property on the right. TT has a much higher Ze because the fault current has to travel back through the ground between two earth rods.

- **Electrician's Guide to the Building Regs** · Supply systems: expected maximum Ze values (TN-C-S 0.35 Ω, TN-S 0.8 Ω) · **p.53**
- **Electrician's Guide to the Building Regs** · Figure: cable sheath earth (TN-S), earthing and main bonding · **p.55**
- **On-Site Guide** · List of earth electrode types (rods, plates, etc.) for TT

THE EARTH FAULT PATH

Suppose a line conductor comes loose and touches the metal case of a load. The fault current travels through the case, along the **CPC** to the **MET**, down the earthing conductor, back through the supply to the **transformer star point**, and round to the protective device, which **trips**. This is **automatic disconnection of supply (ADS)**.

> **Earth is not a current-carrying conductor under normal conditions.** It only carries current when there's an **earth fault**. For ADS the circuit breaker or fuse must disconnect within the Table 41.1 time (**0.4 s** on a TN final circuit). Where an RCD gives the protection, a non-delayed RCD must trip within **300 ms** at its rated residual current.

> **Why TN-C-S has a risk**
> Because the neutral and earth are combined in the supply cable, damage to that PEN conductor (a nick or a cut) means more than **losing your earth**: all the earthed and bonded metalwork in the installation can rise towards line voltage. On TN-S, a problem with the sheath earth only affects that one property, so it's easier to spot. On your own circuits, you can use the **armour of SWA cable** as the CPC.

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