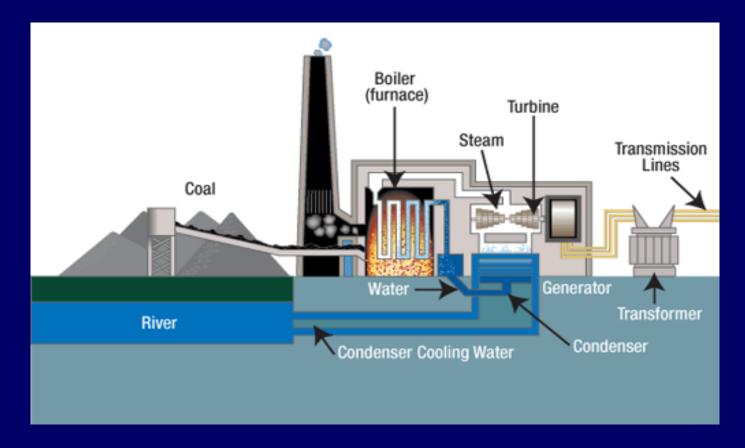


Distribution & Earthing Systems



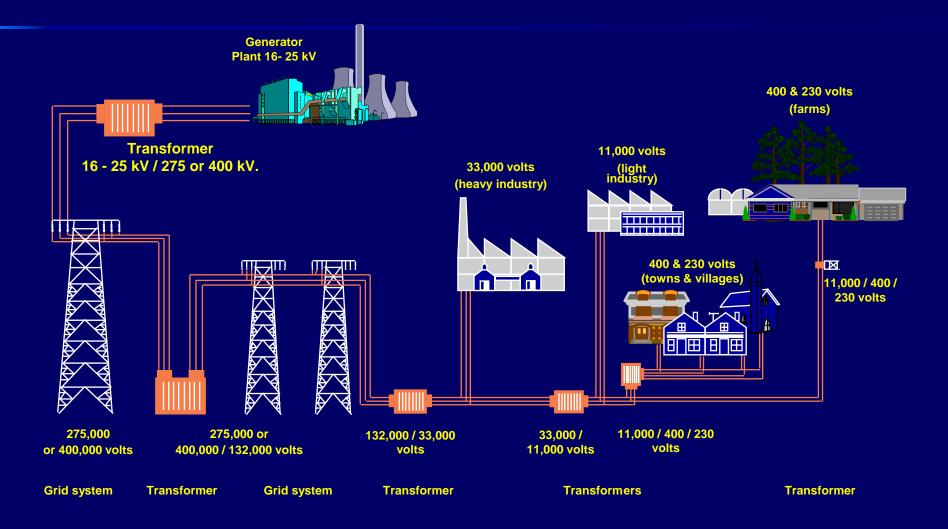
Generation

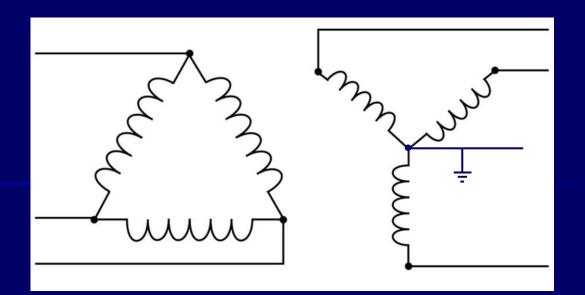
Fossil fuelled power plants operate by burning fuel to heat water & produce steam to turn the turbine, which is the prime mover of the generator.





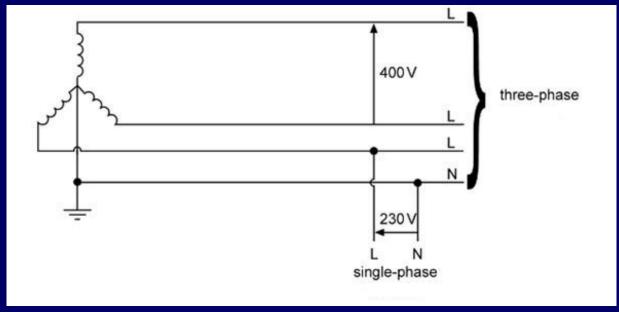
Distribution (U.K.)







Three Phase Step Down Transformer





Earthing (Terminology)

Earth — The conductive mass of earth, whose electrical potential at any point is conventionally taken as zero.

Earthing — Connection of the exposed-conductive parts of an installation to the main earthing terminal of the installation.

Earth Electrode — Conductive part, which may be embedded in the soil or in a specific conductive medium, e.g. concrete, in contact with earth.

Earthing Conductor — A protective conductor connecting the main earthing terminal of an installation to an earth electrode (TT) or other means of earthing (TN).

Circuit Protective Conductor (cpc) – A protective conductor connecting exposed-conductive-parts of equipment to the main earthing terminal.

Equipotential Bonding — Electrical connection maintaining various exposed-conductive-parts and extraneous-conductive-parts at substantially the same potential.



BS 7671 lists five types of earthing system: TT, TN-S, TN-C, TN-C-S, and IT.

T = Earth (from the Latin word Terra)

N = Neutral

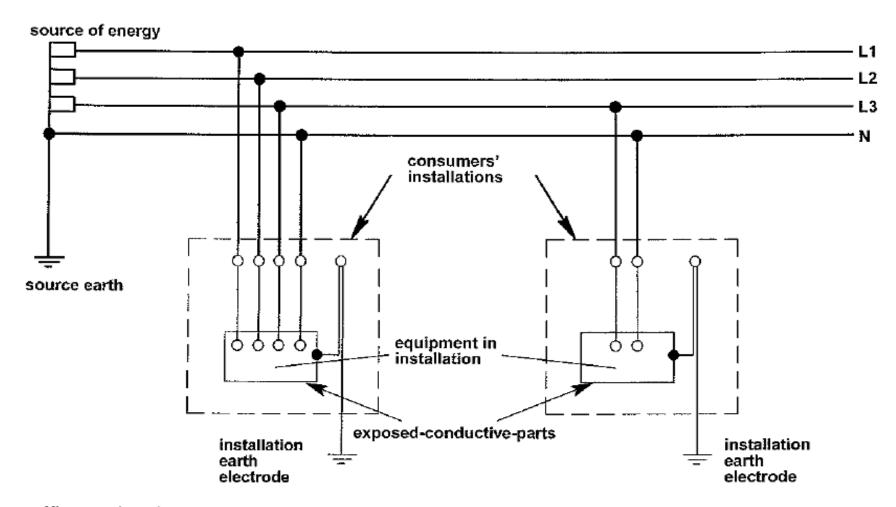
S = Separate

C = Combined

I = Isolated (The source of an IT system is either connected to earth through a deliberately introduced earthing impedance or is isolated from Earth. All exposed-conductive-parts of an installation are connected to an earth electrode.)



Fig 2.5 TT system



All exposed-conductive-parts of an installation are connected to an earth electrode which is electrically independent of the source earth.

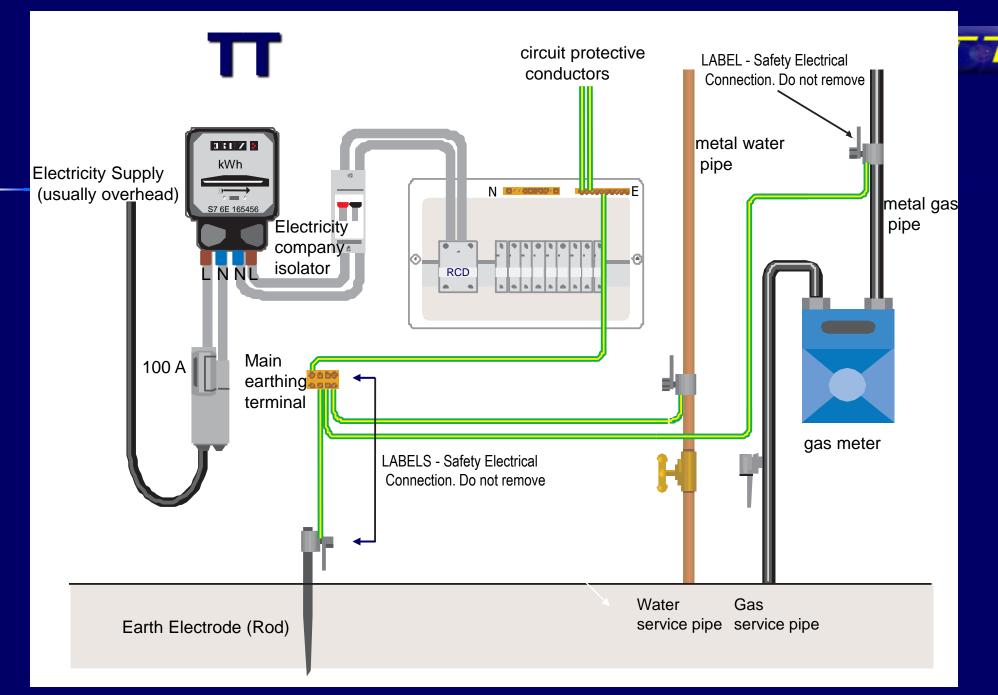
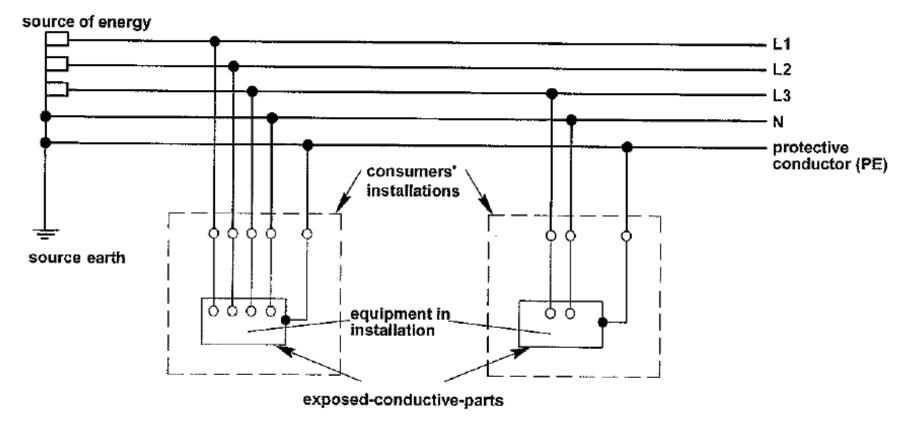




Fig 2.3 TN-S system



Separate neutral and protective conductors throughout the system.

The protective conductor (PE) is the metallic covering of the cable supplying the installations or a separate conductor.

All exposed-conductive-parts of an installation are connected to this protective conductor via the main earthing terminal of the installation.

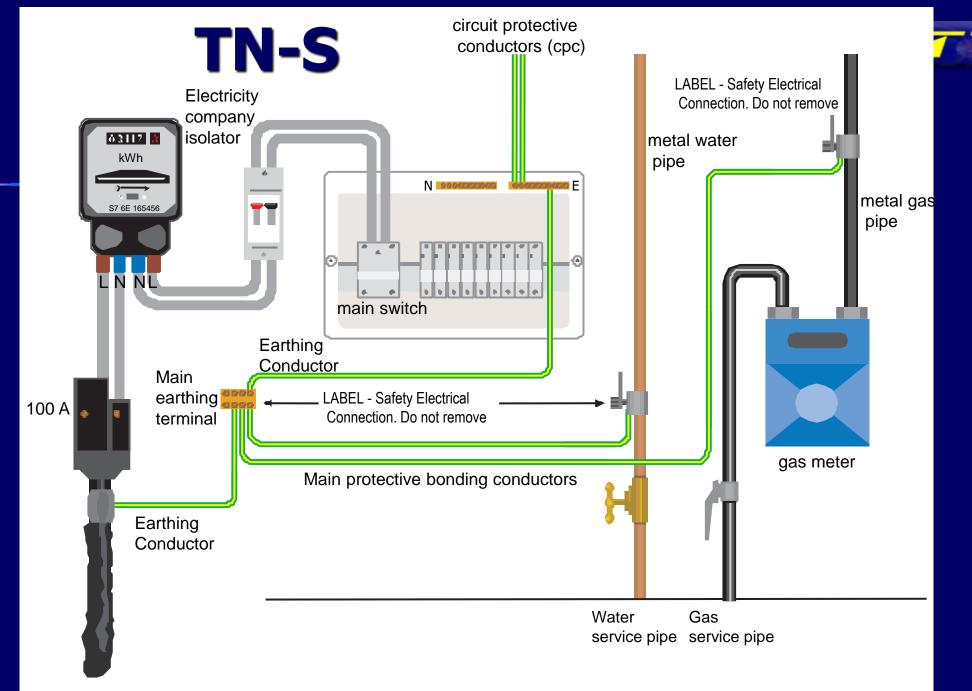
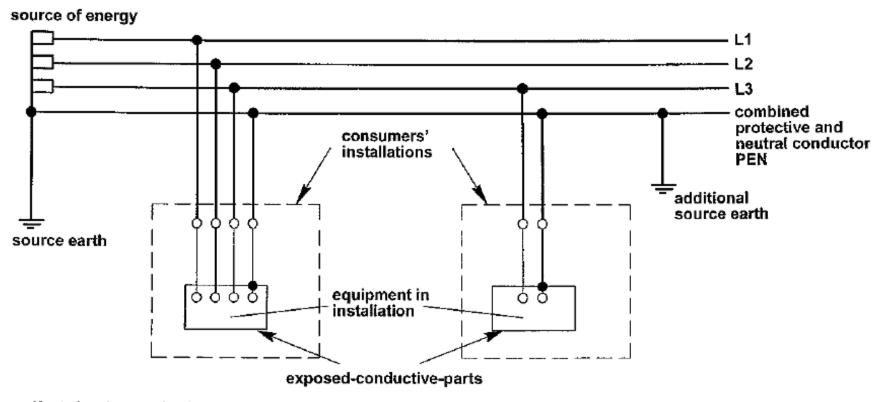




Fig 2.2 TN-C system

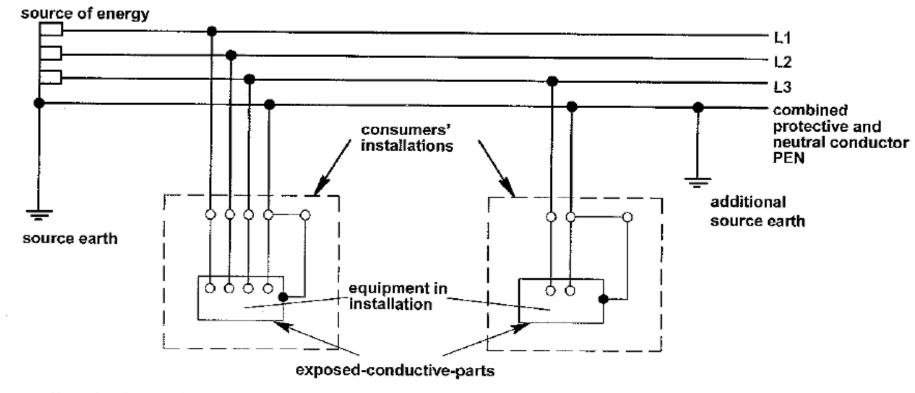


Neutral and protective functions combined in a single conductor throughout system.

All exposed-conductive-parts of an installation are connected to the PEN conductor.

Regulation 8(4) of the Electricity Safety, Quality and Continuity Regulations 2002 states that a consumer shall not combine the neutral and protective functions in a single conductor in his consumer's installation.

Fig 2.4 TN-C-S system



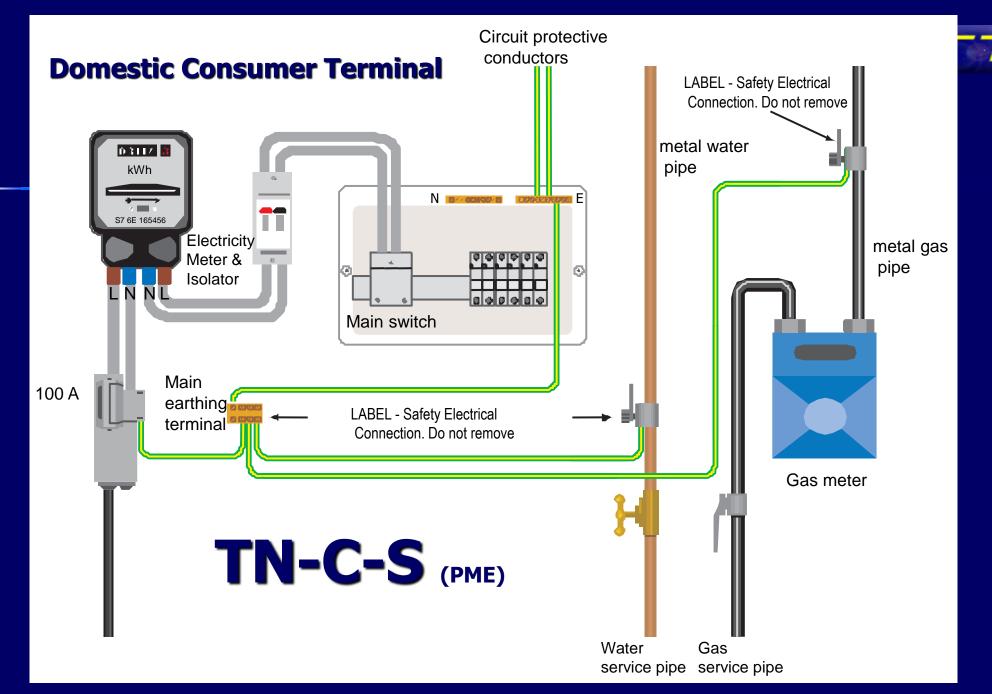
Neutral and protective functions combined in a single conductor in a part of the system.

The usual form of a TN-C-S system is as shown, where the supply is TN-C and the arrangement in the installations is TN-S.

This type of distribution is known also as protective multiple earthing.

The supply system PEN conductor is earthed at two or more points and an earth electrode may be necessary at or near a consumer's installation.

All exposed-conductive-parts of an installation are connected to the PEN conductor via the main earthing terminal and the neutral terminal, these terminals being linked together.





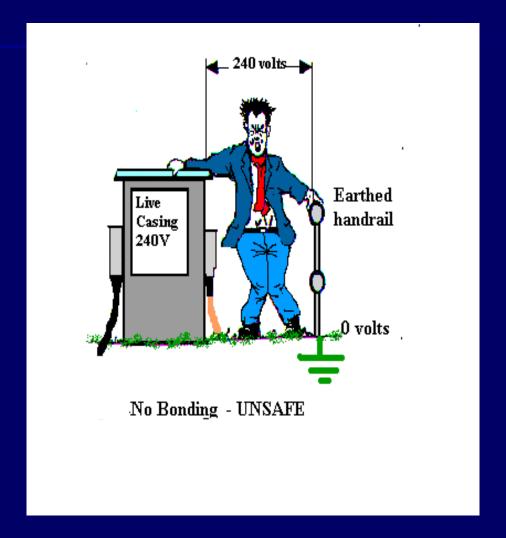
Equipment Bonding

Exposed Conductive Part *Transformer casing.*

Extraneous Conductive Part Handrail

No bonding.

Person can receive a severe electric shock if equipment becomes faulty.





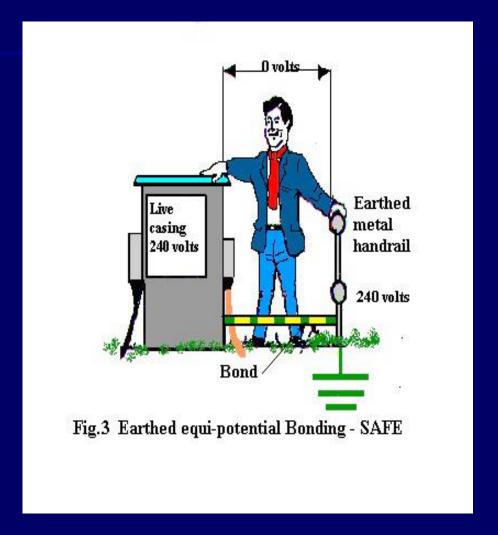
Equipment Bonding

All equipment bonded together.

No potential (voltage) difference between live casing and handrail.

This is called

Equipotential bonding



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