Earthing system

[International standard](http://en.wikipedia.org/wiki/International_standard) [IEC 60364](http://en.wikipedia.org/wiki/IEC_60364) distinguishes three families of earthing arrangements, using the two-letter codes **TN**, **TT**, and **IT**.

The **first letter** indicates the connection between [earth](http://en.wikipedia.org/wiki/Ground_%28electricity%29) and the power-supply equipment (generator or transformer):

T

Direct connection of a point with earth (Latin: terra);

I

No point is connected with earth (isolation), except perhaps via a high impedance.

The **second letter** indicates the connection between earth and the electrical device being supplied:

T

Direct connection of a point with earth

N

Direct connection to neutral at the origin of installation, which is connected to the earth

The conductor that connects the exposed metallic parts of the consumer is called *protective earth* (*PE*). The conductor that connects to the star point in a [three-phase](http://en.wikipedia.org/wiki/Three-phase) system, or that carries the return current in a [single-phase](http://en.wikipedia.org/wiki/Single-phase) system, is called *neutral* (*N*). Three variants of TN systems are distinguished:

|  |  |  |
| --- | --- | --- |
| TN-S-earthing.svg | TN-C-earthing.svg | TN-C-S-earthing.svg |
| TN-S: separate protective earth (PE) and neutral (N) conductors from transformer to consuming device, which are not connected together at any point after the building distribution point. | **TN-C**: combined PE and N conductor all the way from the transformer to the consuming device. | **TN-C-S earthing system**: combined PEN conductor from transformer to building distribution point, but separate PE and N conductors in fixed indoor wiring and flexible power cords. |

**IT network**

In an **IT** network, the distribution system has no connection to earth at all, or it has only a high [impedance](http://en.wikipedia.org/wiki/Electrical_impedance) connection. In such systems, an [insulation monitoring device](http://en.wikipedia.org/wiki/Insulation_Monitoring_Device) is used to monitor the impedance. For safety reasons this network is not accepted under European norms.

