



What is static electricity?

Static means not moving. Static electricity is an electrical charge that doesn't move. All materials are made up of atoms. An atom is the smallest particle of a material that still contains the properties of the material. Each atom consists of a positively charged nucleus around which one or more negative electrons move. In an idle state, the positive charge of the nucleus is equal to the sum of the negative charge of the electrons moving around the same nucleus. Therefore the charge is neutral (see figure 1).

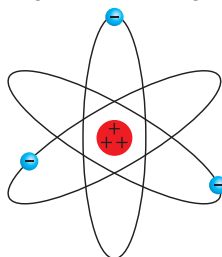


Figure 1

If the nucleus loses or gains electrons, an imbalance is caused. An atom that has lost one or more electrons then has a positive charge, and an atom that has gained one or more electrons has a negative charge and is called an ion (see figure 2).

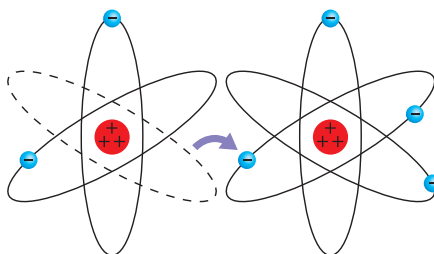


Figure 2

There are only two types of charge: positive and negative. Atoms with the same type of charge repel one another, while those with the opposite type of charge attract one another.

How is static electricity generated?

Static electricity is a surface phenomenon and is generated when two or more surfaces come into contact with one another and are separated again. This causes a sort of splitting, or a transfer of negative electrons from one atom to the other. The level of charge, (the field strength) is dependent on a number of factors: the material and its physical and electrical properties, temperature, humidity, pressure and speed of separation. The greater the pressure or the speed of separation, the greater the charge (see figure 3).

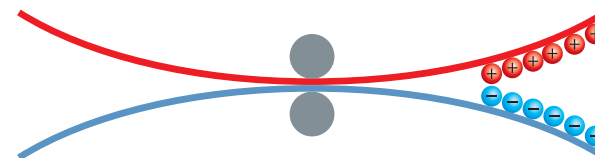


Figure 3

Static charge is greater during the winter months due to low humidity. When the relative humidity is high, some materials can absorb moisture, as a result of which the surface can become semiconductive. The static charge will then remain low or even disappear entirely as a result of the (semi)conductive surface.

A number of materials are indicated in the tribo-electric series (see figure 4). As a result of friction, these materials will take on a positive or negative charge. The magnitude and polarity of the charge depend on the position in the series.

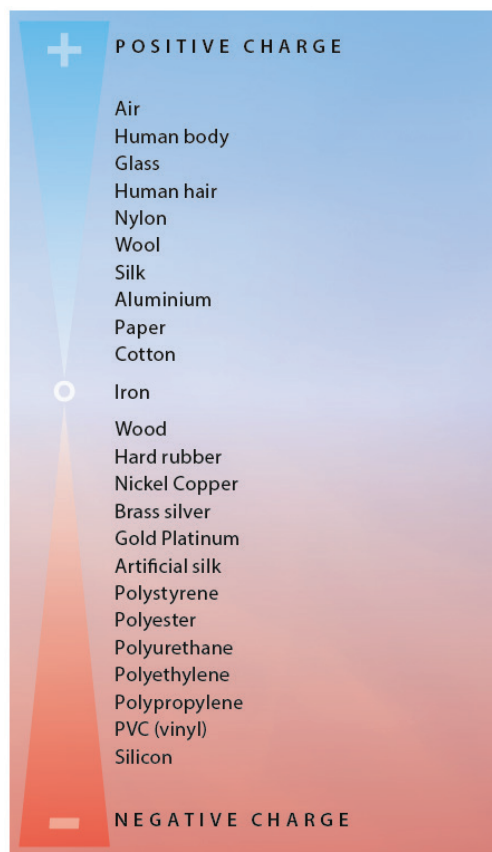


Figure 4: Tribo-electric series

Conductive and non-conductive materials (insulators)

Materials can be divided into two basic groups: conductors and insulators. In a conductor, the electrons can move around freely. In principle, a conductor that is arranged in an insulated way can take on a static charge. This charge can easily be eliminated by connecting the conductor to earth (see figure 5).

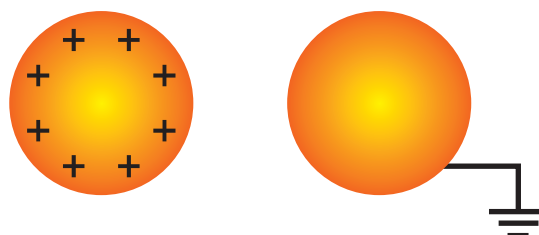


Figure 5

Non-conductive material can retain static charge for a long time, even having opposite polarities in different places. The electrons cannot move around freely. This explains why materials are attracted in some zones and repelled in others. Connecting to earth does not work because the material has non-conductive properties (see figure 6). Only active ionisation offers a solution to this.



Figure 6

What is the effect?

In production processes, static charge can often be a severe disruption, as it means that materials get stuck to machine parts or to each other. Operators do not like getting electric shocks. The dust in the surrounding area is attracted by the electric charge. In explosion-hazardous zones, static charge can cause a spark, which in turn can cause a fire or even an explosion.

How can static electricity be controlled?

Neutralising the static charge of nonconductors is carried out by means of active ionisation. Simco-Ion is world-renowned as a producer of ionisation equipment.

At the high-voltage points of this equipment, air molecules are split up into positive and negative ions.

The static charge on the product attracts ions of the opposite polarity, thus neutralising the material.

Simco-Ion has a wide range of equipment to choose from depending on which type is the most suitable for certain production processes or applications. However, static electricity can also be useful. Using high voltage, materials can be given a static charge so that they will stick to each other temporarily, thus simplifying production processes.

To put it simply, Simco-Ion makes equipment for measuring and controlling static electricity.