

Static Electricity - shocks and how to avoid them

Why do we experience shocks from static electricity?

Many people ask why they experience shocks when they touch something metal, e.g. a door handle, filing cabinet, lift, window frame, photocopier etc.

Static electricity is generated whenever two materials are in contact with each other. All materials are made up of electrically charged atoms. In the universe there are equal amounts of negative electrical charge (electrons) and positive charge (protons). These generally stay in balance at every location.

However, when two materials are in contact, some of the charges redistribute by moving from one material to another. This leaves an excess of positive charge on one material and an equal negative charge on the other. When the materials move apart, each takes its own charge with it. One material becomes charged positively and the other negatively.

If the materials are able to conduct electricity away the charges will dissipate and eventually recombine. In this case, static electricity effects may be too small to be noticed. However, if the charges are separated faster than the material can dissipate them, the amount of electrostatic charge builds up. Eventually a high voltage, and the effects of static electricity, may be noticed.



If you experience static shocks while working in an area where flammable atmospheres (solvent vapours or dust clouds) might be present, seek advice immediately. There may be a fire or explosion risk.

Why do I get shocks when I touch the door knob, filing cabinet or other metal object?

Most modern shoes have highly insulating plastic soles. As you walk, static charges can build up on the soles of the shoes. This is especially true if the floor is also insulating. Some older nylon carpets are particularly good at generating static electricity.

The charge on the shoes soles induces static electrical charge on your body, and this charge appears as a high voltage. Under severe conditions, up to 15,000 Volts have been recorded. It is quite common to experience 5,000V. In fact, many people do not feel a shock from a static electricity discharge less than about 2,000-4,000V.

If you are indoors, the point can be proved by walking around for a while with no shoes on - you will probably not experience static shocks.

I get shocks when I'm sitting, or get up from the chair - and I haven't walked anywhere!

When you sit in a chair the contact between your clothes and the chair can generate a lot of electrostatic charge on your clothes. While you stay in contact with the chair your body voltage stays low. If you lean forward so you back moves away from the chair back, or if you get up out of the chair, then you take the electrostatic charge with you. Your body voltage can rise very rapidly to a high voltage as the charge is separated from it's opposite charge on the chair.

Why do I experience shocks, when my colleagues do not?

There are many reasons why this might be so. Firstly, some people are more sensitive to shocks than others. For most people, the threshold for feeling shocks is in the range 2,000-4,000V.

Secondly, you may be storing more static electricity than others. This depends on the size of your body and feet, and the thickness of your shoe soles! A bigger body, bigger feet, and thinner shoe soles, means more charge has to be stored to produce the same voltage. This gives a higher energy electrostatic discharge.

Thirdly, you may be generating more charge than others. This may be due to the material of your shoe soles, or the way that you walk. If it happens when sitting, it may be due to the material of your clothes and/or the material covering the chair.

Does the weather affect static electricity?

Static charge build-up is enhanced when the air is dry. So, static problems and effects are often noticed in dry air conditions.

The air outside can be very dry when the weather is cold and dry. Indoors, central heating or air conditioning can give very dry conditions which promote static electricity. Heating warms the air and reduces its humidity.

Static shocks are often noticed in cold dry weather, especially when in a centrally heated environment, and may disappear when the weather gets more humid. Static shocks may also be encouraged by air conditioning in hot weather.

Are static shocks a health risk?

Fortunately there is little risk attached to such electrostatic discharges. In most cases they are just a nuisance albeit an uncomfortable one.

The biggest risk is that a shock could cause you to have an accidental injury. For example, you might withdraw your arm suddenly and hit it against something.

How can I stop static shocks?

If there is nothing obvious then it will come down to trial and error and you may have to experiment..

Ask a colleague to do the same things as you do in your room. If they do not get a shock then its probably caused by something specific to you interacying with the materials in the room, e.g. carpet, chair covering.

Go and do the same sort of work in a colleague's room. If you do not get a shock check what is different, e.g. the carpet or chair covering may be of different material.

Try working in bare feet for a while (be careful!) and see if this helps eliminate/reduce the shock. Try wearing different soled shoes, preferably those with natural material soles (e.g. leather) and/or clothes of different materials.

Unfortunately if this does not help the cure is not easy.

You can try raising the air humidity to 40-50% rh with a humidifier. (The Health and Safety Unit can check the humidity in your work place or you can check the humidity with a cheap humidity meter from a gardening shop.)

It is possible to treat some floors with static dissipative treatments - but the benefit of this will probably wear off after a while. Contact Cleaning Services for this.

You may need to have a different floor covering.

It may be possible to physically 'earth' certain items if equipment. Contact Estates for this.

I get shocks when I'm shopping - how can I stop this?

Once again, you build up electrostatic charge as you walk around. However, if you're pushing a trolley, the wheels of the trolley can also generate static electricity. As you walk around, you and the trolley both store charge and reach a high voltage. When you reach to touch something, you get a shock.

These effects are made worse by the warm dry air in many shopping areas, and the floor coverings which are used. Even if they were treated against static electricity when installed, this treatment may have work off.

As before, if you wear leather soled shoes while you shop, this may help. Otherwise, you could try holding a key and touching some metal rack with it, to discharge the static electricity painlessly before you touch things by hand.

What about shocks when I get out of my car?

Sitting in the car, electrostatic charges are generated on the car seat and the person's body, due to contact and movement between the clothes and the seat. When the person leaves the seat, they take half of this charge with them. As they get out of the vehicle, their body voltages rises due to this charge - a voltage of 10,000 Volts is not unusual.

When they reach to touch the vehicle door, the electrostatic discharge and shock occurs as their hand approaches the metal door.

The voltage build-up can often be avoided by holding onto a metal part of the door frame as you leave the seat and before you make contact with the ground. This provides a return dissipation path for the charge on your body.

If you have forgotten to hold the metal door part as you leave the seat, a shock may often still be avoided by touching the glass window before you touch the metal door. The glass may be conductive enough to dissipate charge, whilst preventing the rapid discharge which is felt as a shock.