

Static Elimination

— The Basics

There are rules in static elimination which must be followed.
A thorough understanding of these principles is essential.

DISTANCE FROM OBJECT TO BE NEUTRALISED

AC ionisation does not have a long life. It recombines quickly.

- The performance of a 1250 Bar is six times better at 25mm than it is at 50mm
- The performance of a 2010 Blower is nearly three times better at 500mm than at 1m

DC ionisation has a longer life than AC ionisation, but DC equipment must still be positioned as close to the object as possible. Ionstorm is the powerful long range static eliminator, but the rule still applies – the further from the object the less ionisation performance is available.

- The performance of a 3850 Ionstorm Bar is twice as good at 300mm as it is at 500mm

Note: To allow the ionisation to cover the whole object, we do not recommend positioning Ionstorm closer than 250mm for the standard Bar and 150mm for the HP Bar.



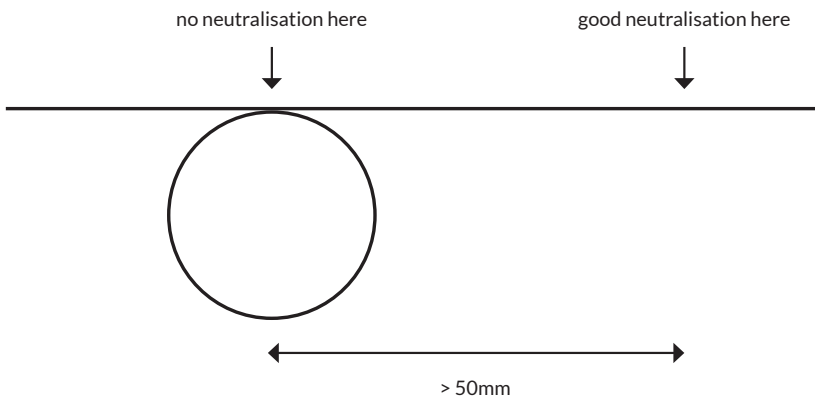
MATERIAL MUST BE IN FREE AIR

If a film is touching a roller, for example, you cannot neutralise the charge with normal AC static eliminators at that point. This causes the most common mistake in our industry.

When the charged material is touching another body, the electric field couples with that body and is not available for neutralisation (or measurement). You must wait until the material has separated from that body.

This also applies to three-dimensional products such as mouldings. A flat moulding sliding down a chute, or on a conveyor, cannot be neutralised. There may be some static elimination, depending how high the product is. The part touching the chute will not be neutralised, the part furthest from the chute will be partly neutralised. Neutralisation depends on the capacitance of the product.

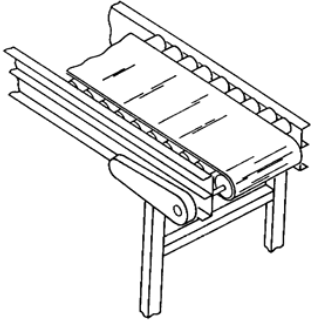
A partial exception to this is with Ionstorm equipment. DC (direct current) ionisation has more ability to neutralise charge which is coupled with another body, because DC can flow through the object, unlike AC. However this is only a partial exception and the general rule still applies: neutralisation is best if the product is in free air.



Notes:

IMMEDIATELY BEFORE PROBLEM

There may be several positions in a process where static may be generated. If you neutralise the static too early, it could regenerate as it passes over rollers or through other processes. So position the static eliminator to neutralise the material at the last possible position before the problem area.



DUST & STATIC

Statically attracted dust must be removed as soon as possible after attraction. If dusty mouldings are stored for a few days, the electrostatic attraction may be replaced by a molecular bonding. When this happens the product cannot be cleaned by neutralising the static charge and blowing-off the dust – the product needs to be wiped with a wet cloth or with solvents. The lesson is to neutralise the charge and remove the dust immediately after attraction. This is important in the injection moulding industry, where mouldings are to be painted. Neutralisation may be needed after moulding, then again after de-flashing.

The **Material in Free Air** rule explained earlier also applies to cleaning with 4110 and 4125 Guns. You cannot completely neutralise a plastic sheet if it is lying flat on a table. This means that it may be able to re-attract dust after cleaning when it is removed from the table.



HEAT & STATIC NEUTRALISATION

A plastic product is not electrically stable until it is relatively cool, 40° - 50° C is a typical target figure for electrical stability. The significance of this is that it is possible for a hot moulding to regenerate some of the charge after neutralisation, if it is still hot. This argues that the static neutralisation should wait until the moulding has cooled to 40° C before neutralisation.

However, the argument for neutralising the moulding as soon as possible is that it will prevent dust attraction from occurring. We often put small ionised air nozzles on robot arms to neutralise the moulding as soon as it is picked up. Using an Ionised Air Nozzle or 2010 Blower is beneficial as it helps to cool the moulding as well as neutralising the static charge.

A secondary static eliminator may be necessary if the static charge is regenerated in cooling.

Notes:

SPEED

Static generation is proportional to the speed of the material. Faster speeds create higher charges.

The speed of the material also determines whether more than one static eliminator bar is required. Some years ago the rule was that if the material speed was over 300m/min then 2 or more AC static eliminators were required. Static eliminators are more powerful now, so can cope with higher speeds, but more than one bar may be required, especially if the charge level is high.

For high speeds, if in doubt specify 2 bars or a Combination Bar consisting of a passive eliminator with an electrical bar. If 2 Bars are specified they should be >50mm apart.

Passive static eliminators do not have a speed restriction.

Where there is a combination of high speed and high charge, it is best to over specify, rather than under specify. The customer wants a solution, not a series of experiments.



THICKNESS OF MATERIAL

For most plastic films the material is transparent to the charge, so neutralising the charge on one side will neutralise it on the other side.

It is possible, however for an independent charge to exist on both sides of a thicker film. For materials over 5mm you should assume that double-sided neutralisation is required.

SURFACE OR VOLUMETRIC CHARGE

Static is normally a charge on the surface of a material and so relatively easy to neutralise.

Sometimes the charge is inside the polymer – for example, due to intense fields produced by corona treating, or the multi-layer nature of some high tech films. These volumetric charges are more difficult to neutralise. Static neutralisation may be possible only when the charge has had time to migrate to the surface.

Notes: