What Is Antistatic?

Readers of Ear To The Ground will be familiar with the fact that energy discharges from uncontrolled static electricity are able to ignite the vapours, gases and dust clouds present in Potentially Explosive Atmospheres.

The term “antistatic” is widely used but is also often misunderstood.

It is sometimes suggested that an antistatic item is one that will not allow any “static” (ie any electrostatic charge) to occur. The inference here being that it must, therefore, be safe to use in a potentially flammable atmosphere. As we will see, this is only part of the picture.

The latest Cenelec report on static electricity (R044-001) is discouraging the use of the word antistatic as it can be misleading. The preferred term is “static dissipative” ('electrostatic dissipative' or simply 'dissipative'). A dissipative object or material is defined as being “incapable of retaining a significant amount of electrostatic charge when in contact with earth….” In other words, the material allows the static electricity to dissipate through it down to earth. This more up-to-date term makes the principle much easier to understand and the definition clearly shows that it is a combination of the type of material AND its connection to earth which prevents the build up and possibly dangerous discharge of static electricity.

Some common problems with the use of antistatic (sorry…static dissipative) items are as follows - the likely reason for the difficulty is shown in *italics*:

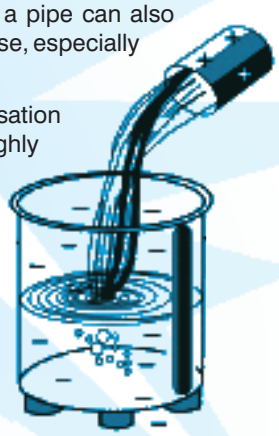
- **Static dissipative footwear is used but people are still building up charge.** *This may be because the floor is non-conductive and prevents the footwear having a path to earth.*
- **Static dissipative kegs are used but are still giving off discharges from the surface.** *This may be because the keg has not been connected to earth by a suitable clamp and cable.*
- **A static dissipative additive has been mixed with a low conductivity liquid but it is still holding charge.** *This may be because the container or pipe holding the liquid has not been connected to earth.*
- **Powder has been placed in an earthed static dissipative liner but is retaining large amounts of charge.** *This may be because the powder is highly resistive and the static cannot travel through it to earth via the liner and earthing cable.*

Fortunately most of these problems can be solved: floors should have suitable levels of conductivity; liners, kegs and containers should be connected to earth with a suitable clamp and cable and low conductivity liquids can be mixed with special additives to increase their conductivity (see inset article). It can be much harder to prevent static electricity in resistive powders as it is difficult to make them dissipative without significantly changing their characteristics.

The Shocking Facts about Static in Liquids

Wherever there is movement, there is the possibility of static electricity being generated. The classic example is a moving belt that can generate a very high static charge and this very same principle is used in the Van Der Graaf Generator (a well known device used to deliberately generate static electricity). Many people, however, overlook the fact that a liquid flowing in a pipe can also generate charge or believe that only by earthing the pipe the hazard will be removed. This is simply not the case, especially with liquids that have a low electrical conductivity.

Solvent	Conductivity (pS/m)
Octane (iso)	0
Decane	0.0001
Hexane	0.0001
Carbon tetrachloride	0.003
Benzene	0.005
Heptane	0.03
Dibutyl ether	0.1
Dioxan	0.1
Pet Ether 40/65	0.1
Xylene	0.1
Pentane	0.28
Light fuels	1
Toluene	1
Cyclohexane	2
Electrical insulating oils	10
Styrene Monomer	10
Shellsols	10
White spirits	10
Diethyl ether	30
Kerosene	50



Many Chemical processes involve pumping, stirring, blending, crystallisation or dissolving, all of which can create static within the fluid. For a highly conductive liquid this charge can flow to the vessel and away along the earthing cable to ground. However if the conductivity of the liquid is low then this charge can build until it can be discharged in the form of a spark.

The conductivity of a liquid is typically measured in picosiemens per metre [pS/m] and the values for a range of low conductivity solvents are shown in the table opposite.

The minimum recommended level for solvents is widely accepted as 50 pS/m but may be much greater for many chemical processes (eg. 2000 pS/m for stirring / crystallisation).

One possible way to minimise the hazard is by the addition of an additive to increase the conductivity of the liquid. One such product is the Octastat Range, which is produced by Associated Octel.

Further details may be obtained from patelr@octel-corp.com Tel: +44 (0) 151 348 6974

This issue of Ear to the Ground was compiled by the Editorial Team of Ellen Paul, Glynn Warren and Graham Tyers, and published by Newson Gale Ltd, Unit 6, Churchill Park, Colwick, Nottingham NG4 2HF United Kingdom. tel: +44 (0)115 940 7500 Fax: +44 (0)115 940 7501 email: ng@newson-gale.co.uk