

Testing Times

On-Going Maintenance of Static Control Procedures and Equipment

A wealth of standards and reports have been written and revised over recent years, on the subject of “the control of static electricity in flammable atmospheres”. Most companies, operating within such an environment, are well aware of the dangers of uncontrolled static electricity, which can act as an ignition source for flammable vapours, dust clouds or gases. With this in mind, it is surprising that many companies still have problems with static electricity; accidents caused by static ignitions are still all too common. Why should this be?

The basic principles of static control: earthing metal plant, avoidance of ordinary plastics and grounding personnel should be well understood. These subjects were discussed in some detail in “Ear To The Ground” Issues 1 and 2 (which are still available by request) and are covered in various British, European and International standards (see reference list, below). Companies can draw on this published information, or involve specialist consultants as a basis for preparing a static control program.

Why then do problems still arise so frequently? One main reason is a lack of *on-going* high level awareness of the principles involved. It is not merely sufficient to establish a static control system, train the staff and then forget about the risk. Unless the issues are actively considered on a regular basis, things can soon go wrong.

When first established, static control procedures usually do what they are supposed to do; fixed plant is correctly bonded to the earthing bars, leads and clamps for mobile plant are in good condition, static-dissipative footwear meets the requirements and everyone remembers to use the equipment provided. Subsequently, plant may be moved and not re-connected to the earthing loop, the number of clamps provided may be insufficient for increased production, and footwear may become contaminated and lose its static-dissipative properties. These problems are compounded if staff become complacent and don't always remember to use the equipment provided.

How can a high level of static awareness be maintained? Assuming that the static control equipment and procedures were installed correctly in the first place, the three pillars of a static control policy are:

- i. Regular testing of the equipment used including logging of results.
- ii. Frequent awareness training for operators and staff, particularly new employees.
- iii. Reference to the standards when changes take place, such as the introduction of new types of plant or materials.

Generally, there are two main elements to the physical side of the static earthing system. These are firstly, the fixed earthing loop, which may take the form of a copper strip running around the internal walls of a room containing a potentially flammable atmosphere. This loop will be connected down to earth via a number of earth cores or grounding rods. This loop should be tested periodically to ensure that it is maintaining a low (typically less than ten ohm) resistance to earth. These tests are fairly specialist, and may be carried out by an outside contractor, often in conjunction with tests on lightning protection equipment. A typical test period would be every 11 or 13 months (so that over a period of time, the tests cycle through the seasons). A main point to look out for when testing the loop, is any significant variation with previous tests, which could show deterioration. This also highlights the need for keeping good records. If the earthing loop meets the necessary low resistance, then any metal object connected to it will also be earthed.

The second part of the physical system is the devices used to connect plant and equipment to the earthing loop. If a piece of plant is fixed, such as the body of a mixing machine, then a simple strong bonding cable can be used to permanently attach it to the earthing loop. However, movable plant, such as the mixer's product bowl, or a 200 litre drum is harder to earth, and the standards recommend that a cable with strong mechanical strength and a “designed for purpose” clamp are used to make a temporary connection when the item is in use. These connections can be tested using an intrinsically safe Earth Lead Tester or ohm meter, and the results for each lead

recorded. These types of flexible connector should be tested more frequently than fixed ones; typically once every three months in the case of earth leads and after every re-assembly, in the case of bonds on removable ducting sections. A bond to a fixed piece of plant may be tested on an annual or six-monthly basis.

The on-going training of personnel may be more difficult to maintain, partly because of disruption to production, and also, as it can be difficult to keep things interesting. Training today need not just take the form of a classroom lecture; new learning media such as interactive CD-ROM provides flexible training solutions to accommodate the varying needs of production schedules, shifts and locations. Team leaders can quickly assess the knowledge level of existing or new operators and programme one or two hours per week to bring knowledge levels up.

Today, it is common for companies to use continuous monitoring of earth connections, and systems incorporating interlocks which prevent a static-generating operation from taking place unless the earth is made. Such systems mean that the frequency of lead testing can be reduced, as the systems are providing a continuous test to a pre-determined resistance level. They also mean that the earthing measures are more likely to be remembered during operation, as a visual indication of earth condition, such as the LED in a Self-Testing clamp, act as a strong reminder. In fact, in the case of interlocked systems, an operation cannot proceed if the earthing measures have been forgotten, or become lost during operation. Other useful equipment includes devices for testing lead and cable continuity, such as an intrinsically safe Earth Lead Tester – see photo.

In conclusion, it can be seen that a wide range of information and equipment is available to help provide a reliable static control system within a flammable atmosphere. It is then vital that such a system is used and maintained, in order to avoid static-caused fires and explosions.

This report is only intended for guidance only, as every situation is different and, for example, suitable periods between tests may vary depending on individual plant processes, etc. If in doubt about any aspects of the control of static electricity, specialist advice should be sought.



Typical time intervals between tests:

Fixed earthing loop with respect to ground:	Every 11 or 13 months
Fixed plant and equipment:	Annually
Earth Monitoring systems and devices:	Annually
Basic earthing leads and clamps:	3 monthly
Footwear:	Weekly or daily, depending on conditions

Reference Sources:

The leading reference sources when considering the control of static electricity in flammable atmospheres are:

British Standard 5958 Control of Undesirable Static Electricity (1991)

Cenelec Report RO44-001 Avoidance of Hazards due to Static Electricity (1999)

NFPA 77 Static Electricity 1993 Edition (USA)