# 'Best Practice' makes sound business sense:
## How to avoid the real cost of non-compliance in **Static Control**

The overall cost of non-compliance can stretch far beyond potential "savings" achieved by ignoring the risk of electrostatic ignitions or by using non-compliant static control methods.

More often than not, static caused fires and explosions result in expensive production downtime, legal and insurance costs related to personnel injuries & fatalities and damage to company property. In numerous cases static caused fires have led to the pollution of the local environment resulting in the loss of public goodwill and the payment of heavy fines imposed by local government. Under ATEX, the European Union's legislation which governs the safety of personnel working in hazardous atmospheres, everybody from suppliers to company directors are open to criminal prosecution if a court determines that adequate Best Practice procedures and equipment have not been used to protect workers.

Fortunately, there are three industry produced Best Practice standards that provide the background to the nature of static electricity, the processes that are susceptible to electrostatic ignitions and the preventative measures that should be put in place to eliminate static electricity as a health and safety risk.

### The best practice standards are:

- ☐ Cenelec CLC/TR:50404* (2003): Code of practice for control of undesirable static electricity, (Cenelec committee CLC/TC 31).
- ☐ NFPA 77(2007): Recommended Practice on Static Electricity,(National Fire Protection Association).
- ☐ Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents, (2003), (American Petroleum Institute).

The standards are produced by committees made up of industry experts in hazardous process safety and show remarkable consistency in the precautionary measures identified for controlling the generation of static electricity.

*For example,* in tank truck** transfers both CLC/TR: 50404 and API standards (NFPA references API for tank truck transfers) recommend:

1. The use of interlocks to stop flow of product preventing the generation of static if the truck loses its earth*** connection.
2. Monitoring the bonding/grounding circuit to less than 10 ohms and providing positive indication to operators that a positive bond/ground connection is established.
3. State the first operation in road tanker transfers is to apply a full earth connection to the vehicle.

The API standard goes a step further stating the grounding clamp should not be removed until the tank truck body is sealed, i.e. removal of the grounding clamp should be the final operation in the product transfer process.

As recommended in each of the standards the most effective method of eliminating spark gaps is to ensure all conductive and semi-conductive objects are bonded and grounded with fit for purpose static control equipment. The static control equipment should be capable of making low electrical resistance contact with charged equipment, combined with maintaining secure and reliable low resistance static dissipative circuits.

A good margin of safety can be assured by ensuring that static dissipative circuits and their connections are regularly checked for resistances greater than 10 ohms. The NFPA 77 and API standards state electrical resistances higher than 10 ohms in metal circuits are indicative of a break in the continuity of the circuit, resulting in the potential and undesirable accumulation of static electricity.

**Minimum Ignition Energies (MIE) of regularly transported gases, vapours and dusts in milli-joules (mJ).**

| | Material | MIE (mJ) |
|---|---|---|
| Liquid Vapour Gas | Gasoline | 0.80 |
| | Ethanol | 0.65 |
| | Propanol | 0.65 |
| | Ethyl acetate | 0.46 |
| | Methane | 0.28 |
| | Propane | 0.25 |
| | Ethane | 0.24 |
| | Hexane | 0.24 |
| | Methanol | 0.14 |
| | Acetylene | 0.017 |
| | Hydrogen | 0.011 |
| | Carbon disulphide | 0.009 |
| Powder | Zinc | 200 |
| | Wheat flour | 50 |
| | Polyethylene | 30 |
| | Sugar | 30 |
| | Magnesium | 20 |
| | Sulphur | 15 |
| | Aluminium | 10 |
| | Epoxy resin | 9 |
| | Zirconium | 5 |

Minimum Ignition Energy of explosive / flammable materials (Source: IChemE)



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The recommendation by all of the standards of monitoring up to 10 ohms is designed to compensate for the effect industrial environments can have on the capacity of equipment to dissipate static well before it has the potential to be a health and safety risk.

Some examples include:

- Inadequate mechanical penetration of electrostatically charged equipment (more info on this in ETTG 16).
- Degradation of circuits and connections resulting from chemical, mechanical or environmental attack.
- Infrequent or inadequate servicing of equipment.
- Human errors in following the correct static control procedures.

The recommendation of utilising <10 ohm circuits should not be confused with the resistance of 1 x $10^6$ ohms often referred to throughout the standards. This is the generally accepted value of resistance capable of dissipating static. This theoretical value is based on the relatively small size of currents that generate static charges in relation to the very high voltages they are capable of inducing. In a basic V = RI equation this makes sense, but when real world effects are taken into account, the standards recommend static dissipative circuits of 10 ohms or less.

To ensure complete protection from incendive spark discharges in operations that require frequent processing of hazardous materials the standards recommend continuous monitoring of bonding/earthing circuits to 10 ohms or less. This ensures that a proper bond or earth connection is established, preferably, before the process is initiated, guaranteeing that an incendive spark will not be discharged throughout the process.

* BS5958-1:1991 was superseded by CLC/TR:50404
*** Static Earthing = Static Grounding / ** Road Tanker = Tank Truck

Another area that can be can be confusing when specifying fit for purpose static control equipment is identifying the difference between hazardous area electrical protection approvals (ATEX, FM, UL, CSA) and equipment designed to control electrostatic ignitions. Approval classifications should not be confused with specifying systems that demonstrate Best Practice compliance in the area of static control. Hazardous area certification only provides a method of protection that guarantee electrical faults are prevented from igniting flammable atmospheres. This has nothing to do with preventing the occurrence of incendive spark discharges from industrial processes. In the same way gas analysers perform functions that detect gases before they become a health and safety risk, static control products should perform functions that ensure spark discharges are prevented well before they can become a hazard.

When specifying static control equipment, hazardous area operators should seek out equipment suppliers that can provide static control products that reinforce compliance with the various Best Practice standards for static control. Hazardous area operators can record this information in their Safety Report for review by the local Health and Safety inspector or corporate body responsible for occupational safety. Should there be an unfortunate incident, investigators will be in a position to rule out static electricity as an ignition source.

The standards for controlling static electricity as an ignition source in hazardous areas are available for purchase on each of the association's websites.

www.nfpa.org | www.cenelec.eu | www.api.org

**For more information on any of the products or subjects covered in this Ear to the Ground, please contact Newson Gale or your local distributor.**



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