Controlling the Dangers of Static Electricity

Static electricity is known to most of us as the annoying phenomenon that we experience when we shuffle our feet along the carpet and then touch a door knob. The momentary spark is alarming, but it doesn't cause any real damage to us. For those people that work in jobs that require handling flammable liquids or gases, the dangers of static electricity are quite different.

A static spark can ignite flammable vapours and combustible dusts, causing fires, explosions and loss of life and equipment. Yet many people are not properly practicing safe static bonding and grounding techniques to avoid these issues and are putting themselves in harm's way on a daily basis.

Static electricity is the culprit in many industrial fires and explosions every year, and it is much more pervasive than most people think.

According to the NFPA, in the US alone at least 280 industrial accidents are caused annually by static electricity. And this statistic only counts those accidents that were reported to fire and emergency personnel (i.e. the big fires and explosions). These accidents can occur in almost any industry that deals with flammables. Process industries such as chemical processing or oil and gas are most at risk.

The risk of igniting flammable material with static electricity is so high, that the National Fire Code of Canada mandates that anyone who handles flammables must drain the static electricity away safely. Fire codes in all industrialized countries have similar requirements, underscoring the importance of this issue.

However, the National Fire Code does not provide guidelines on how to properly and safely drain static electricity from a process or piece of equipment, which leads many people to try different approaches that may be flawed or dangerous.

A recent study of 310 accidents in the chemical industry showed that 70% of the static electricity incidents were caused by improper grounding. Operators, maintenance personnel, and plant electricians are simply not educated on the proper way to ground static electricity and maintain the static grounding systems.

Common Static Grounding Mistakes

The most common mistake made when designing a static grounding system is to use clamps that are not designed for static discharge.

For example, battery clips are used extensively by people who have not had proper static bonding and grounding experience. The problem with battery clips is that they have sharp points, but have weak springs that will not withstand regular use.

Quite quickly, the spring will cease to provide a strong grip which will mean that there is not good metal-to-metal contact and the clip may even be prone to falling off during operations.

Another incorrect choice is to use welding clamps. While welding clamps have stronger springs than battery clips, they are built with flat ends to the clamp that can't assure good metal-to-metal contact. Without strong sharp points on the end, you cannot be sure that the clamp will be able to penetrate paint, rust, or dirt.

The second most common mistake is a lack of verification for the static grounding system. Most operators do not know if their static grounding clamps and wires will actually drain static electricity when they are used.

Typically, a static grounding clamp is attached to a plated steel or copper cable that terminates at a known ground point (e.g. ground rod, ground bus). The concept is that the static electricity will flow through the clamp and cable to ground.

Lind Equipment's StaticSure portable static monitoring system is shown here monitoring a barrel.

However, wear and tear, weather, corrosion and other factors can quickly degrade that connection between the clamp and the known ground point. Many facilities do not have proper maintenance procedures in effect to verify this connection, which is typically done with an ohm-meter measuring the resistance from the known ground point to the tip of the clamp.

More often, even if there is a maintenance program in place for the static grounding systems, the verifications are done intermittently.

This can result in a problem with the static grounding system that goes undetected for months at a time.

Recently, a facility verified an outdoor static grounding assembly that was connected to a known ground point using very thick insulated copper cable. It was always assumed that the cable could not fail as it was mechanically very robust. Visual inspections confirmed that the system was in place and should operate.

However, the ohm-meter showed that there was no electrical continuity between the clamp and the known ground point; the static grounding system was completely ineffective. Upon removing the insulated jacket, it was discovered that the cable had been severed in an area that could not normally be seen. If the assembly was being monitored by a static monitoring system, workers would have been aware of the danger in real time.

Ideal Static Grounding System

An ideal static bonding and grounding system uses properly designed (and regularly maintained) static grounding clamps, robust cabling, and a real-time monitoring system to warn users immediately if there is not a good connection to the known ground point.

A properly designed static grounding clamp has a very strong spring to provide pressure on the points so that they are pushing against the metal surface.

The points themselves are typically made out of stainless steel and sharpened to cut through paint, rust and dirt. These clamps will last a long time, but must be regularly

coils back up when not in use, keeping it o
of the way of operators. Copper cable ca
be used as well, but should be properly i
sulated to avoid damage to the conducto
inside.

Lastly, ideally the static grounding oper
tion will have a static monitoring system
place that will warn operators if there is n
a safe connection to drain static electricit
These systems work by sending an intrin
cally safe signal through the entire leng
of the static grounding assembly from th
clamp to known ground point.

The system then confirms that there is
safe path to ground, i.e. the clamp is co
nected properly to the piece of equipmen
and that the cable will carry the static ele
tricity all the way to the known grou
point.

Static Monitoring Systems

Traditionally, these static monitoring sy
tems have been large, expensive, perm
nently fixed point solutions that are on
used at bulk loading and unloading bay
However, new technology solutions a
small, inexpensive, portable battery opera
ed units that can be brought anywhere th
flammable transfers are happening.

Lind Equipment's new StaticSure li
of portable static monitoring systems a
lows for static grounding applications th
couldn't use monitoring in the past to e
sure the safety of the operators and equi
ment. For example, drumming operatio
typically could not afford to place fixed poi
monitoring systems at every station.

StaticSure portable static monitoring sy
tems are inexpensive enough to be use
all over a facility. Another new applicatic
would be for remote bulk unloading, whe
there is not infrastructure in place for a fix
point monitoring system.

StaticSure portable static monitoring sy
tems are small enough to be stored in a ca
of a truck and be conveniently availab
whenever the need arises at any location.

Static electricity is a real danger, and or
that often can't be detected until it's to
late. The lack of clear direction from the Fi
Code, coupled with general lack of know
edge, has created a situation where ma
facilities believe they are well protected b
are not.

By using properly designed static grou