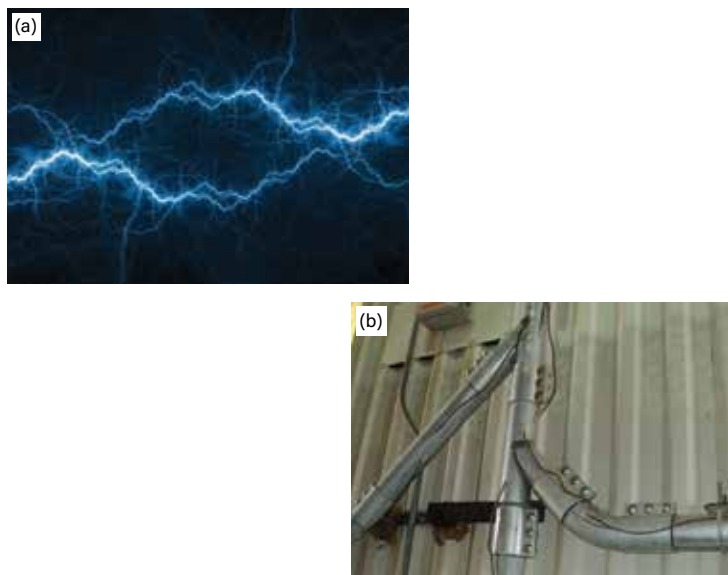


Static Accumulation Gives Warning Signs

March 2025



▲ **Figure 1.** (a) Electrostatic discharge is the result of static charge buildup, which can be caused by solid material flow through a pipe or duct; liquid transfer, mixing, and filtration; and fluids and solids handling processes like sieving, milling, blending, and more. (b) To mitigate static charge buildup, duct systems like the one shown above must be adequately grounded. In this system, well-maintained grounding wires can be seen attached to each segment of the duct.

Static charge buildup and discharge can be possible sources of ignition in processes involving flammable materials (Figure 1a). Analyzing case studies of process safety incidents caused by static accumulation reveals warning signs that can help engineers avoid similar mistakes.

Case study 1. An operator was screening a pharmaceutical powder by manually loading a mechanical vibrating sieve. The sieved powder was collected below in a stainless steel drum on a dolly with insulating nylon wheels. A dust flash fire occurred between the sieve and the drum. The operator had experienced small electric shocks from the collecting drum for several months before the fire without recognizing these smaller shocks as a potential ignition source.

Case study 2. An operator was adding powder from plastic bags to a reactor. There was a flash fire at the manway, which engulfed the operator. The operator was not injured. There were several warning signs before this incident. Powder was sticking to the plastic bags, making it difficult for the operator to empty them. Additionally, bags were sticking to the operator and charging the chute.

Did You Know?

- Static discharges are frequent ignition sources for flammable and combustible materials. (See Process Safety Beacons from Dec. 2008 and Feb. 2021).
- When two surfaces come into contact and then separate, an electrostatic charge can be transferred between those surfaces. This can occur during pneumatic transfer, sieving, milling, blending, and pouring.
- The two connecting surfaces can be a solid and a liquid during liquid transfer, mixing, and filtration. It can also be two solid materials, such as solid material flowing in or out of a container or flowing through piping or ductwork.
- Static charge can also be generated by equipment in motion such as conveyor belts moving over rollers.
- Static discharges have warning signs, including sounds like a snap or crackle, visual signs like a bluish arc or glow, and a prickly sensation on hands or arms.
- Grounding and bonding are important safeguards to prevent static charge accumulation, but they must be maintained to be effective (Figure 1b).
- Static accumulation can be detected using fixed or portable meters.

What Can You Do?

- Heed the warning signs of static accumulation listed above. When you see, hear, or feel any of these warnings, report them to your supervisor. They can issue a work order to have someone investigate and correct them.
- Report damaged or loose grounding cables to your supervisor.
- Discuss static accumulation and discharges during hazard analyses as potential ignition sources.
- Review static generation during dust hazard analyses (DHAs); solids handling frequently generates static.

Avoid the shock of static charge buildup.