

Static electricity can build up as a stationary electric charge on the surface of an object or a person and, under the right conditions, can discharge, causing someone to feel a shock. These shocks caused by static electricity occur mainly when the atmosphere is dry, particularly in winter.

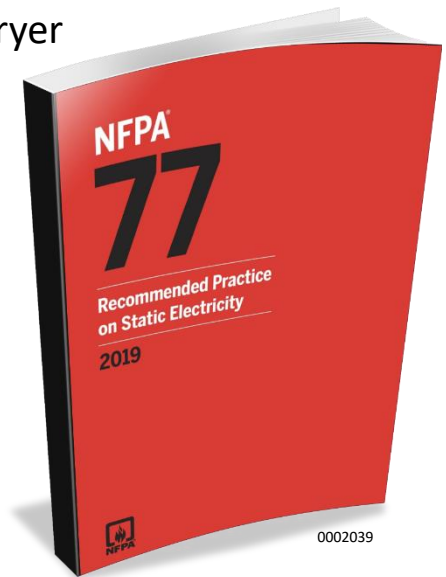
Common situations when static electricity is noticeable in our everyday life include:

- the brief electric shock felt when a person touches a metal object after walking across a carpeted floor or stepping out of a vehicle
- the crackling and clinging of fabrics as they are removed from a clothes dryer

➤ The human body is an electrical conductor and can accumulate a static charge if insulated from ground.

To most people, static electricity is simply an annoyance, but in many industries, particularly those **where combustible materials are handled, static electricity can be quite dangerous** as the work environment then becomes at risk for fires and explosions.

This safety topic reviews the hazards of static electricity in production, manufacturing and industrial environments.



The NFPA 77 Recommended Practice on Static Electricity addresses safety-related work practices when static electricity may be a concern in work areas near flammable and combustible materials. OSHA does not mandate that all work follow the guidance found in the NFPA 77 but may use the standard to determine if an employer took reasonable precautions to avoid a fire or explosion incident ignited by static electricity, and if not, could be at risk for a potential citation under the General Duty Clause.

Static shock can be unpleasant, but the brief jolt that is felt is typically not dangerous. However, there may be a situation when the shock causes a sudden, involuntary reaction that results in a slip, trip or caught-in injury.

If charge accumulation, that results in the static electricity, cannot be avoided and no flammable gases or vapors are present, consideration should be given to the various methods by which contact with metal parts can be eliminated and worker-generated static electricity can be dissipated.

Use of the following in the workplace may be necessary to prevent charge accumulation that can lead to static electricity:

- nonmetal handrails
- insulated doorknobs
- nonconductive shields
- static dissipative mats (ESD mats)
- antistatic wrist straps
- static dissipating boots
- antistatic or conductive clothing



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OSHA Standard 1910.136(a) *The employer shall ensure that each affected employee uses protective footwear (...) when the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures.*

When friction causes a high level of static electricity to build up, the discharge can cause a fire or explosion if flammable or combustible substances are nearby. For example, this can happen when handling plastic pipes and materials or during normal operation of rubberized drive or machine belts found in many worksites. Grounding or other static control measures need to be taken to prevent the static electricity buildup wherever ignitable mixtures might be present.

OSHA Standard 1910.106(e) Industrial Plants and 1910.106(h)(7)(i)(a) Processing Plants *Precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include but are not limited to open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions; and radiant heat.*

Because you can't see static electricity, it may be more difficult to identify potential sources.

- Static electricity can be generated by materials in motion, for example:
 - contact and separation, materials unwinding or passing over a roller
 - liquids moving through hoses or pipe systems
 - rapid heat change when material goes through an oven
 - pouring, mixing, pumping or filtering fluids
 - filling drums, cans, pails or tanks
 - sheet cutting, slitting or trimming processes
- Dry environments are more prone to static buildup. Any moisture in the air can help disperse the static charge on an object.



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There are two basic steps when evaluating static electricity hazards that might be present in the work area:

1. Identify locations where charges separate and accumulate
2. Assess ignition hazards at these locations



Report any static electric shocks you encounter in the work environment immediately.

- Any spark or shock to personnel should be investigated.
- All potential static electricity hazards should be evaluated, especially in work areas that may be near flammable materials or in environments with combustible dust or powder.

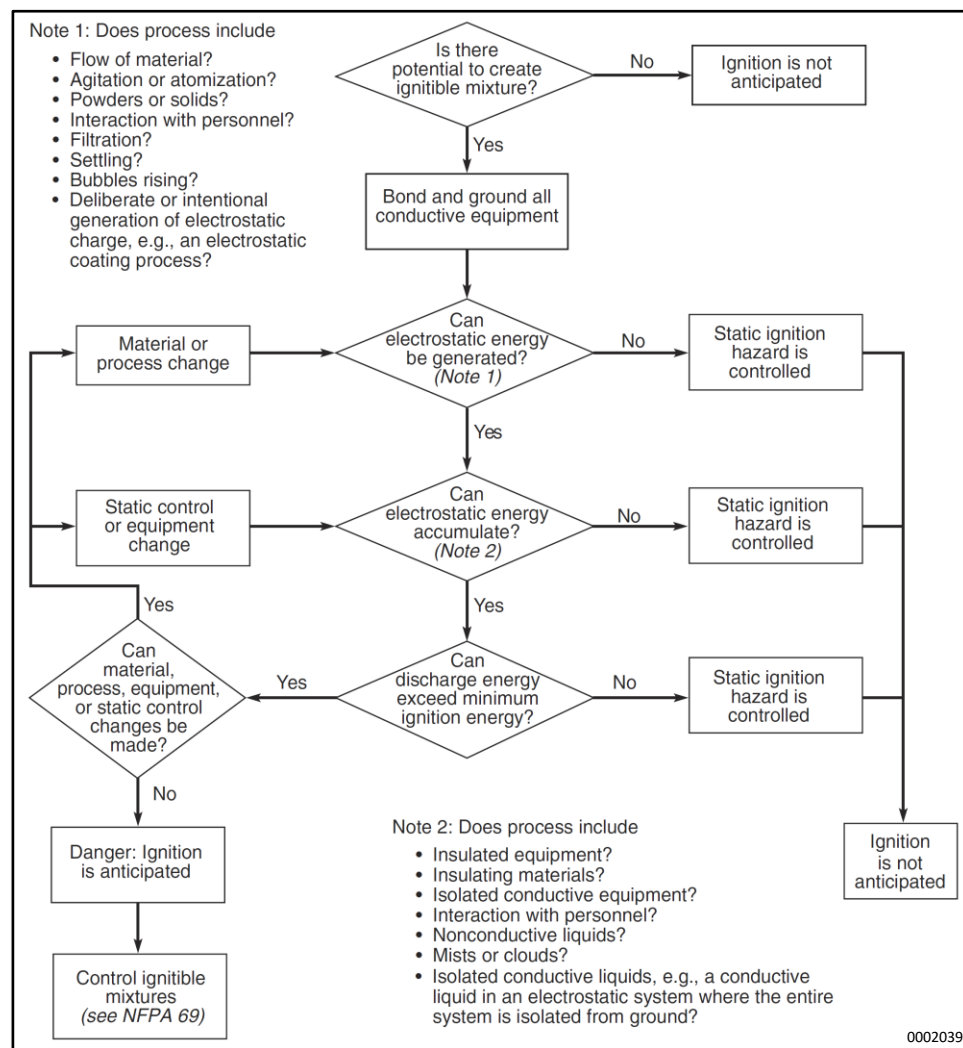


Figure 6.1.2 Flow Chart for Determining Static Electric Ignition Hazard from NFPA 77 Recommended Practice on Static Electricity

Ignition hazards from static electricity may be controlled by methods such as:

1. Engineering specific solutions on facility operations that reduce charge generation, charge accumulation or both by modifying the process or the product.
2. Inerting of the equipment.
3. Adding ventilation on or near the equipment or the area where the equipment is used.
4. Relocating the equipment to a safer area away from ignition hazard, relocating the ignitable materials, and/or operating outside the flammable range.
5. Removing the ignitable mixture from the area where static electricity could cause an ignition-capable discharge.
6. Neutralizing the charges, the primary methods of which are grounding isolated conductors and air ionization.



- Static electricity warning and grounding safety signs can be used to keep workers safe in work areas where shocks from static electricity can be a nuisance, damage equipment or pose a fire hazard.
- Signs can alert visitors and remind workers to ensure they are electromagnetically discharged before handling equipment or entering designated areas.
- Signs can be placed at points where static discharge is required.

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