

January 2009 Safety Meeting

Static Electricity

What Is Static Electricity and Where Does It Come From?

Static electricity is electricity at rest, or simply not moving. A material with either too many or too few electrons in its atomic structure has a static electrical charge. Other than an attraction to other materials, it is relatively harmless. However, if a conductive path is provided for the static electricity, the resulting static discharge or spark may cause the ignition of propane vapor. When propane mixes with air (2.15 to 9.60% by volume), the resulting mixture can be ignited easily by a static discharge. Static discharge is sometimes cited as the possible cause of fires or explosions.

Advances in chemistry and technology have brought us new polymers and synthetics that have increased the likely presence and generation of static electricity. For example:

- Wood and steel are being replaced with polymeric materials such as high-density polyethylene (HDPE)
- Polyvinyl chloride (PVC) and stretch wraps are used to cover and secure loads
- PVC pipes are replacing metal pipes in low-pressure systems
- Natural fabrics are being replaced by synthetics
- Automation has brought faster production speeds

The study of static electricity has grown exponentially over the past decade. However, there is still a vast misunderstanding about how it works where propane is transferred and handled.

Static electricity can come from a number of sources. Atmospheric lightning is the largest and most violent form.

Most of the static electricity we experience in our daily lives is not as dramatic. In fact, we usually don't notice it at all, or if we do, we don't pay it much attention. This is the static electricity created or generated by friction, scientifically called tribogeneration. Walking across a loading dock with rubber-soled boots, removing a wool sweater, and wind blowing over stretch wrap are all examples of friction generating static electricity.

When any two materials touch and separate, one material rips electrons away from the other material creating an imbalance or charge. It happens with all materials. The material that receives the electrons has a negative charge, and the material that gave them has a positive charge.

Different combinations of materials will develop different levels of static charge or voltages. Relative humidity, speed of movement, the materials' size, and the materials' electrical properties are all factors in determining how much static will be generated and how it's going to behave.

When we walk across a carpet, the soles of our shoes separate from the carpet, there is friction inside our shoes and socks, and our clothes rub against our bodies. These sources of friction generate a static charge. Then, if we reach out to touch a light switch or other conductive material, a spark is emitted.

Other examples include fuel flowing at high velocity through a small opening, which can generate enough static electricity in the fuel vapors to ignite them. Also, the friction of a dry wind blowing over cellophane or stretch wrap may energize the wrap. The wrap, in turn, may induce a charge into nearby conductors. A conductor can be any material that an electric current can pass through. Non-conducting materials resist the flow of electric currents.

STATIC DISCHARGE PREVENTION QUICK TIPS

1. Know the area

Be aware of Static Discharge Control Areas; that is, any area where propane vapors may be released or pooled. Some areas may be designated as Static Discharge Control Areas; however, any transfer, storage, or processing location where the odor of propane is present should be considered a Static Discharge Control Area where appropriate static discharge prevention measures should be taken. Remember, the odor of propane is a warning.

2. Ground your personnel

Are all personnel in the Static Discharge Control Area properly grounded? People generate static charge by movement, and they can carry the charge a considerable distance before discharging. Static-safe footwear or temporary foot grounders allow the wearer to discharge safely to a static-safe floor or floor mat before the charge levels become great enough to spark. Other grounding methods are available, including conductive wrist bands with cords.

3. Ensure proper attire

Cotton and cotton blends will generate less static electricity than most synthetics and polyester materials. (Static-safe garments and fabric treatments are available.) Be aware of any garments or layers of garments that snap and crackle when put on or removed. Never put on or remove garments inside a Static Discharge Control Area.

4. Clean up

Remove all plastics, HDPEs, and other synthetic materials from Static Discharge Control Areas. Chargeable materials necessary for operation may be treated with topical anti-static coatings.

5. Follow the code

Is your equipment properly grounded? Any electrical equipment inside a Static Discharge Control Area must be installed in accordance with NFPA 58 and state electrical codes and regulations. Metal, non-electrical stationary equipment, such as rollers, should also be grounded.

6. Observe your processes

Most static electricity comes from the friction between materials. Processes that involve non-conductive materials will usually generate static electricity.

7. Limit access

Limit access to Static Discharge Control Areas to those people necessary to conduct normal business activities.

8. Listen

Take note of the observations of people working in Static Discharge Control Areas. They are the ones who witness static discharge events first hand and thus are the first to be aware of a static threat.

Class Discussion

Allow employees to discuss incidents where static electricity has occurred while they were on the job. Are there areas that you need to improve on so that static electricity is not a hazard in your workplace?

Conclusion

Knowledge is everything...knowledge about static electricity can save lives and property. Be aware of the causes and take the necessary precautions on the job. For a complete manual on Static Electricity, go to www.propanesafety.com to download it for free.

January 2009 Test

Static Electricity

Name: _____

Date: _____

Instructions: Read and answer each of the following questions. When complete, grade the test and review incorrect answers so each employee is “armed” with the correct answers before they leave the training.

1. People do not generate static charge so grounding does not apply to them.
 - a. True
 - b. False

2. Static Electricity is electricity that is moving at high rates of speed right before it shocks you.
 - a. True
 - b. False

3. Static Electricity can be an ignition source for propane.
 - a. True
 - b. False

4. Atmospheric lightning is the largest and most violent form of static electricity.
 - a. True
 - b. False

5. Any electrical equipment inside a Static Discharge Control Area must be installed in accordance with _____ and state electrical codes and regulations.
 - a. NFPA 54
 - b. NFPA 86
 - c. NFPA 58
 - d. State Plumbing Code

6. Which are factors in determining how much static will be generated and how it's going to behave?
 - a. Materials' electrical properties
 - b. Chance of Rain
 - c. Speed of movement
 - d. Both A and C
 - e. Both B and C

7. A Static Discharge Control Area is any area where propane vapors may be released or pooled.
 - a. True
 - b. False

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Answer Sheet

1. b.
2. b.
3. a.
4. a.
5. c.
6. d.
7. a.