

1996~2006

Celebrating 10 Years of Service & Excellence

Limiting the Risks of Arc Flash Hazards

by Pamela Wang, EIT

An arc flash event is a dangerous condition that can not only destroy electrical equipment, but also cost lives. An arc flash is the flow of electric current through the air between electrical components that releases a tremendous amount of energy. Recent changes to safety codes are aimed at preventing arc flash events and the resultant damages.

So how do you prepare your facility with the proper procedures and materials to establish an electrically safe work environment?

One of the first steps is to perform an arc flash hazard analysis. The analysis will determine the risk of personal injury as a result of exposure to electrical arc flash, as well as determine the necessary measures to prevent injury from an arc flash event. Some of these measures include providing guidelines for the different categories of arc flash hazard, providing proper personal protective equipment (PPE), and establishing flash protection boundaries.

NFPA 70E divides arc flash levels into five hazard/risk categories. The categories range from zero to four, category zero being the lowest in risk and four being the highest. An arc flash hazard analysis will determine the hazard/risk category at electrical equipment which will correlate with the type of PPE that should be worn. For example, maintenance personnel working in a category zero condition are required to wear untreated cotton clothing, while maintenance personnel working in a category four condition are required to wear cotton underwear, a flame-resistant (FR) shirt, FR pants, and a multi-layer flash suit.

Performing an analysis will also define a flash protection boundary around electrical equipment. The boundary sets approach limits to live electrical equipment where individuals could receive a second degree burn. All safety guidelines should be followed and the proper PPE should be worn when working in this boundary.

To prepare for an analysis, facility owners should document the facility's electrical system by preparing a one-line diagram that illustrates the power system in a simplified format. Additionally, the one-line diagram should be available to all personnel servicing electrical parts as electrical systems in facilities change frequently. A current one-line diagram is important, because equipment that may appear to be de-energized may be served from a separate power source and actually be energized. Facility personnel should always use a current one-line diagram in referencing electrical equipment to determine all possible power sources. Providing documentation of the existing system is an effective way to limit the chances of an arc flash occurrence.

Below is a list of safety measures that help limit the risks of an arc flash event:

- ◆ Provide Appropriate Personal Protective Equipment (PPE)
- ◆ Use Proper Tools/Equipment
- ◆ Train Employees
- ◆ Establish and Follow a Safety Program
- ◆ Have Proper Warning and Label Signs (see our November 2006 newsletter)
- ◆ Prepare, Maintain and Use a Current One-Line Diagram

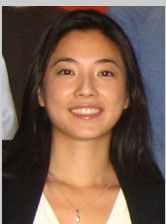
For further explanation of these and other industry standards for establishing an electrically safe work environment, refer to NFPA 70E. **Williams Notaro & Associates, Inc.** is also available to assist in preparing your facility for a flash hazard analysis.



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& Associates, Inc.

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Pamela is an electrical engineer with **Williams Notaro & Associates, Inc.** She earned a B.S. in Electrical Engineering from Virginia Polytechnic Institute and State University, and her Engineer-in-Training (EIT) certification from the State of Virginia. She is an active member of the Institute of Electrical and Electronics Engineers (IEEE), and the founder and chair of the Richmond IEEE Women in Engineering Affinity Group. Pamela's experience in designing control systems adds to WNA's depth in designing today's complex building systems.

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Did You Know?

Maintaining your switchboard isn't just good preventive practice — it is required by code in the District of Columbia. DC Municipal Regulations (DCMR) Title 12 Construction Code states that it is the responsibility of the owner to have a licensed electrician disconnect switchboards of 1000 Amperes or greater at least every three years and provide the following preventive maintenance:

- ◆ Vacuum entire interior of the switchboard
- ◆ Clean the bus & contacts with suitable non-conductive solvents
- ◆ Lubricate all moving mechanisms
- ◆ Check all conductors for abrasions & replace them if found in poor condition
- ◆ Torque the bus & conductor connections to the manufacturer's recommendation
- ◆ Check the calibration of the overcurrent trip units & protective devices
- ◆ Evaluate short circuit protection
- ◆ Megger switchboard to manufacturers' specifications before re-energizing
- ◆ Replace worn, damaged, or deteriorating components
- ◆ Submit the preventive maintenance report to the DC Electrical Inspection Branch within 30 days

Like routine car maintenance, providing preventive maintenance to your switchboard may extend its life and reliability, as well as limit safety risks.

Resource: DCMR 12 Construction Code 2003, Chapter 3C Wiring Methods and Materials, Article E-381-37, page 229.

Win A \$50 Gift Card!

Enter Our Installation Contest at www.wnainc.com

As 2006 comes to an end, our 10th anniversary monthly issues will be replaced by quarterly issues that will continue to feature our popular Bloopers Contest. Our web site will feature a photo that illustrates the importance of including Construction Administration in the Engineering scope of work. Even small, seemingly unimportant installation deficiencies can cause poor system performance, increased maintenance, or reduced equipment longevity. By correctly identifying the quarterly installation blooper, you will be automatically entered to win a \$50 gift card to a local restaurant or store. **December drawing will be held Friday, January 12.**



November's blooper (below) shows obstructed ductwork. Return ductwork and fire dampers must remain clear of all obstructions to insure proper operation. Allowing the use of the return system as a path for power and communication wiring can lead to poor return air flow and dangerous compromises in the life safety system components in the building.

Congratulations to our November winner **Courtney Gilcrease** with **In-terplan, Inc.** in Washington, DC. She received a \$50 Outback Steakhouse gift card for correctly identifying November's installation blooper.