

### ARC FLASH & WORKPLACE SAFETY HAZARD STUDIES CAN MITIGATE RISK

Safety in the workplace is always a primary concern, especially when high-voltage electricity is involved. New 2014 National Electrical Code (NEC) requirements demand equipment labeling that provides operators with detailed information about arc flash hazard, a potentially life-threatening event. Yet despite this new law, many owners and operators remain in the dark about the process behind accurate labeling and the ramifications that compliance may have on safety, personal protective equipment (PPE), and associated costs. This newsletter explains how BC&A can perform an Arc Flash Hazard Analysis and how it can help mitigate the potentially deadly risk of Arc Flash while also saving money.



**! WARNING**

*Are you ready for 2014 NEC Regulations?*

*An Arc Flash Hazard Analysis can assure compliance, save lives, and save money.*

#### WHAT IS ARC FLASH?

*Arc Flash is an electrical explosion that can be the result of a rapid release of energy due to an arcing fault. An arc fault is similar to the arc obtained during electric welding. The fault has to be manually started by something creating the path of conduction or a failure such as a breakdown in insulation.*

#### ARC FLASH HAZARD ANALYSIS

Conducting an Arc Flash Hazard Analysis is necessary to obtain the information required by OSHA and NEC for proper labeling. An analysis consists of four steps:

##### 1. Collect Data

Gather information about the facility's power distribution such as:

- One-line Diagram(s)
- Nameplate Information
- Length and Size of all Cables

##### 2. Conduct a Short Circuit Study

The short-circuit study is based on a review of one-line drawings. The drawings must be created if they do not exist, and field-verified if they do. Maximum available fault current is calculated at each significant



point in the system. Each interrupting protective device is then analyzed to determine whether it is appropriately designed and sized to interrupt the circuit in the event of a bolted type of short circuit.

### 3. Review Equipment

The associated equipment must be reviewed to insure that the bus bar is adequately braced to handle the available fault current. The bolted fault currents are then converted into arc fault currents for additional analysis.

### 4. Conduct a Breaker Coordination Study

A coordination study is the examination of the electrical system and available documentation to ensure that over-current protection devices are properly designed and coordinated. Over-current protective devices are rated, selected and adjusted so only the fault current carrying device nearest the fault opens to isolate a faulted circuit from the system. This permits the rest of the system to remain in operation, providing maximum service continuity. The Breaker Coordination study consists of time-current coordination curves that illustrate coordination among the devices shown on the one-line diagram. Protective devices are set or adjusted so that pickup currents and operating times are short but sufficient to override system transient overloads such as inrush currents experienced when energizing transformers or starting motors. The data from the Short Circuit and Breaker Coordination can be used to perform a sensitivity study to adjust breaker/fuse characteristics to lower the PPE requirement. To achieve this goal, the existing breakers may need to be replaced; old breakers have relatively slow reaction times and will trip at too high a current. To limit the flash hazard the breakers are adjusted to trip earlier than before. It is expected that the outcome of a sensitivity study, when implemented, will result in most category 4 PPE requirements being decreased to category 1 or 2.

## COMPLIANCE, SAFETY & SAVINGS

Arc Flash Hazard Analyses are primarily important for the safety of workers, though they can also help reduce PPE costs. Bowen Collins & Associates can help you comply with OSHA requirements by adhering to the 2012 NFPA 70E Standard for Electrical Safety in the Workplace. We can perform Fault Current Studies, Overcurrent Protective Device Studies, and Arc Flash Hazard Analysis.

For more information regarding Arc Flash services that BC&A can provide please contact Darin Youngstrom, PE (208) 939-9561 or [dyoungstrom@bowencollins.com](mailto:dyoungstrom@bowencollins.com)

**HAZARD LEVELS & PPE REQUIREMENTS**

**⚠ WARNING**

**Arc Flash & Shock Hazard  
Appropriate PPE Required**

<b>FLASH PROTECTION</b> Flash Hazard Category: <u>4</u> Min. Arc Rating (cal/cm2): <u>40</u> Flash Protection Boundary: <u>36</u> <b>PPE:</b> <input checked="" type="checkbox"/> Cotton Underwear <input checked="" type="checkbox"/> FR Shirt and Pants (or FR coverall) <input type="checkbox"/> Full Flash Suit and Hood <input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Safety Glasses or Goggles <input type="checkbox"/> Hearing Protection <input checked="" type="checkbox"/> Leather Gloves and Shoes	<b>SHOCK PROTECTION</b> 220 VAC Shock Hazard When: Cover Is Removed Limited Approach Boundary: <u>42</u> Restricted Approach Boundary: <u>12</u> Prohibited Approach Boundary: <u>1</u> <b>PPE:</b> <input checked="" type="checkbox"/> Class 4 <input checked="" type="checkbox"/> V-Rating <input type="checkbox"/>
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Equipment ID: AB19486

**NEW NEC REGULATIONS REQUIRE EQUIPMENT LABELING FOR ARC FLASH HAZARD (SHOWN ABOVE) MUST HAVE ONE OF THE FOLLOWING:**

- AVAILABLE INCIDENT ENERGY AT CORRESPONDING WORKING DISTANCE;
- MINIMUM ARC RATING OF CLOTHING;
- REQUIRED LEVEL OF PPE;
- HIGHEST HAZARD RISK CATEGORY FOR THE EQUIPMENT; NOMINAL SYSTEM VOLTAGE; AND ARC FLASH BOUNDARY.



Category 4 PPE

**AN ARC FLASH HAZARD ANALYSIS CAN RESULT IN A SAFER WORKPLACE, OFTEN REDUCING PPE REQUIREMENTS FROM CATEGORY 4 (SHOWN ABOVE) TO CATEGORY 1 OR 2 (SHOWN BELOW).**



Category 1 PPE



Category 2 PPE