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Ring & DuChateau, LLP

Innovative Design Solutions Since 1961
HVAC Plumbing Lighting Electrical Fire Protection Commissioning

March 4, 2009

Arc-Flash

Volume 1, Issue 1

Upcoming topics:

- Retro-Commissioning.
- Thermal Imaging Photography.
- Boiler Burner Retrofit.
- Backflow Protection.

WHAT IS IT?

Arc Flash is an electrical short circuit, where a high level of current passes through air. Arc Flashes cause electrical equipment to explode, resulting in an arc blast with temperatures exceeding 35,000° F (the surface of the sun is 9000° F). In an arc blast, vaporized solid metal conductors expand several thousand times their original volume, and can travel at speeds in excess of 700mph. The result of this violent event is usually destruction of the equipment involved, fire, and severe injury or death to any nearby personnel. Typically, this is a result of short circuits created by dropped tools, loose equipment, insulation failure, and dust, corrosion and/or condensation within electrical equipment.

ARC FLASH PROTECTION

Maintenance personnel should properly protect themselves from an arc flash by wearing the proper amounts of personal protective

equipment (PPE). This PPE equipment can range from simple cotton clothing for Level 0 rated hazards to special fire resistant clothing worn under a specifically rated arc flash suit that resembles an astronaut's space suit for level 4 rated hazards. In larger installations, hazard levels may exist that no amount of PPE equipment can sufficiently protect.

NFPA COMPLIANCE REQUIREMENTS

Does NFPA require that you have an Arc Flash Study? The short answer is - It depends. NFPA 70 (National Electrical Code) only requires that a label stating that an arc flash hazard exists at each piece of distribution equipment. The NEC does not require that the level of hazard be identified. NFPA 70E (Electrical Safety in the Workplace) requires that the arc flash level be identified to obtain an "Energized Electrical Work Permit." The arc flash hazard level can be identified by either an Arc Flash Study, or by referencing numerous tables within NFPA 70E

which provide **approximated** arc flash levels and the required protection required.

HOW TO REDUCE ARC FLASH HAZARDS

In order to increase the safety of the electrical distribution system, it is desirable to lower the arc flash hazard at each point in the distribution system by decreasing the available energy that a fault can draw. There are three ways in which to lower arc flash hazards; reduce the available fault current from the Utility (out of the facility's control), increase the impedance within the distribution system (impractical and costly), and shortening the time that a fault condition can exist by adjustments to circuit breakers and/or fusing within the existing distribution system.

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Why should you have an Arc-flash study?

The primary reason for an arc flash study is to prevent serious worker injuries or death, but other notable reasons include reducing your exposure to litigation, minimizing equipment damage in a fault condition, code compliance, and potential insurance benefits. A report by CapSchell, Inc. reports that in 2003, one to two workers were killed everyday by Arc Flash explosions, and an additional 10

to 15 workers found themselves in hospitals or burn centers because of Arc Flash incidents.

If an electrician must operate or work on an piece of distribution equipment where the arc flash level and PPE requirements are not identified, the worker is required to establish the arc flash hazard and the required level of PPE by applying multiple sections within NFPA

70E before proceeding. This application of code will be performed under a demanding set of circumstances, where restoration of power in a timely manner is of the utmost importance. An Arc Flash Study will eliminate this delay and increase the worker safety by providing this information at each distribution point.

How can Ring & DuChateau help?

Arc Flash Studies can be completed to different technical levels to meet the needs of each facility.

A basic level Arc Flash Report

would include arc flash labels for each piece of equipment based on the estimates provided within the tables in NFPA 70E. The estimates that NFPA 70E provide are conserva-

tive approximations, and may set the hazard level and PPE requirements higher than the actual calculated value.
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An advanced Arc Flash Study would model your existing distribution system, taking into account the actual over current protective devices and settings, conductor sizes and lengths, and the available Utility fault current. The hazard level and PPE requirements will be **cal-**

culated on actual available incident energy, and may be lower than what would be reported in the basic level report.

A comprehensive Arc Flash Study would provide the same level of calculation as

an advanced study, but also include recommendations for adjustment or replacement of equipment to reduce the incident energy at all high hazard locations within the system.

If you want to be “ahead of the curve”, give us a call!



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