

Tools Are Available to Help Comply with Arc Flash Standards

The National Fire Protection Association (NFPA) recently released the 2009 Edition of *NFPA 70E: Standard for Electrical Safety in the Workplace*®. This standard is what OSHA follows to enforce safety in the workplace when an employer is audited. The OSHA Standard provides the “Shall” portions of the standard and the NFPA 70E provides the “How” of complying with the standard.

This revised standard affects the requirements for an employer to properly comply with arc flash warnings and regulations. Arc flash is a type of electrical explosion that results from a low impedance connection to ground or another voltage phase in an electrical system. Die casters will need to follow the standard to properly label equipment, define what personal protective equipment (PPE) must be worn around the equipment if it is going to be worked on or opened while energized and provide training to personnel to ensure that these requirements are followed.

Before the equipment is labeled, an analysis of each piece of equipment must be conducted in order to ascertain the information that is to be included on the label.

Labeling

All electrical equipment will have to be identified and the proper labels must be affixed to all equipment panels. It is neither the equipment manufacturer’s nor the installer’s responsibility to provide the analysis or affix the warning label to the equipment. The sole responsibility falls on the die caster.

An arc flash analysis is required to assimilate the data and information necessary to determine the level of hazard at each electrical panel or enclosure. NFPA 70E requires that the following enclosures be surveyed and labeled:

- Breaker Panels
- Fuse Panels
- Main Switch Gear
- Distribution Panels
- Motor Control Buckets
- Motor Control Panels
- Any Panel likely to be serviced by a worker

This most likely encompasses all of electrical equipment in a die caster’s facility. Each piece of equipment must have a label affixed to it that meets ANSI Z 535 Standard (www.nema.org/stds/z535/). This standard requires the label to meet certain size, layout, content and reliability standards.

The arc flash label should include the indication that an arc flash hazard is present, what corrective action should be taken, the risk hazard category, the incident energy, the arc flash boundary distance in inches, the voltage present in the enclosure, the limited approach boundary, the restricted approach boundary, the prohibited approach boundary and the class of Personal Protection Equipment (PPE) to wear along with the actual voltage protection requirement.

Conducting an Analysis

The required analysis should obtain information on the energy levels, boundary distances and the class of PPE required to be worn. This analysis also requires that all electrical equipment be on a one-line drawing of the facility. On this, all equipment from the main entry point of the utility is listed with the following pertinent information:

- Equipment ratings
- Size and type of conduit or raceway to end use or next piece of switch gear
- Conductor size, type and length of run
- Breaker or fuse size, style, RMS current interruption capacity and bolted fault current interrupting capacity and time to open fault

In order to ascertain all this information, all the equipment panels must to be opened so the information can be gathered and/or verified in order to ensure the validity of the calculations. If this is not done and the wrong PPE is used and a fault occurs that injures an employee, the employer would be held responsible.

Using Trained Personnel to Conduct the Analysis – Companies could provide training to their own personnel to conduct the analysis. The equipment being checked should be turned off or de-energized so the equipment and panels can be opened and checked without requiring high level PPE. High level PPE would be required for checking live or energized equipment; however, de-energizing and locking out the electrical source is always preferred over working on a electrically live device. In most cases, the information needed to complete the analysis can be gathered from a de-energized and locked out device.

There could be some cases where companies would find themselves in a bind while trying to ascertain the information if they do not already know the proper PPE required to access the equipment panel *and* are unable to de-ener-

gize the electrical source entirely. For example, the proper PPE must be worn in order to access the panel, if it is live, to gather the information, but that information may not be known without accessing the panel first — which must be done while wearing the proper PPE. In order to be on the safe side in this case, the trained personnel should wear a 112 cal/cm²-rated suit in order to not violate the requirement. However, this level of protection could possibly increase the risk of an accident due to the restricted visibility and limited mobility the PPE imposes on the personnel.

An advantage to using trained personnel to conduct the analysis is that employees will already know the plant electrical layout quite well and, with training, would be able to perform the analysis efficiently.

Using an Outside Engineering Firm to Conduct the Analysis – With the above requirements, cost and time to use and train personnel to conduct the analysis, it may be advantageous for employers to hire an engineering firm specializing in facility studies to gather this information. These firms often have software packages that approximate the hazard levels for each individual panel and provide their agents with all the PPE required for the hazard levels they will encounter at a facility. Although the cost for this method would be likely be higher, it could potentially limit the chances for accidents during the analysis.

Regardless of which method a company chooses, up-front training providing an awareness program for employees — even while the analysis is being conducted and before the labels are affixed to the equipment — is very

important. Some states offer free training for this, and some engineering firms can provide it for a cost.

Tools and Resources

Literature

This document includes example arc flash calculations. NFPA 70E: Standard for Electrical Safety in the Workplace: <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70E> lower on this page, through the link “View the 2009 edition of this document.” It is viewable at no charge after registration.

Training


The NFPA 70E seminar, given throughout the U.S., covers what safety requirements employers are legally required to provide for their workers, as well as steps required for working on or near live parts (arc flash): <http://www.nfpa.org/catalog/product.asp?pid=70E2>.

Arc Flash Calculators for Developing Labels

This software has the capability of printing labels: http://www.arcadvisor.com/arcflash/afa_v30_calculation_example_2.html.

This site provides an arc flash calculator for Bussmann fuses and circuit breakers: <http://www.bussmann.com/arc-flash/index.aspx>.

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