



## **Arc-Flash Analysis—Utility System Parameters Critical for Accurate PPE**

### **Introduction**

NEMA has long recognized that equipment short circuit current ratings and interrupting ratings are determined by the engineer or contractor after understanding the available fault currents to which they will be subjected. Utilities have long standing practices to provide a conservatively high maximum level of available fault current based on their transformer stock that could be used or replaced. Once again, NEMA recognizes that this has been an accepted industry practice that ensures equipment is appropriately rated to control electrical energy safely. However, the introduction of arc-flash protection in NFPA 70E, *Electrical Standard for Safety in the Workplace*, is changing industry needs to ensure a safe maintenance environment beyond the safe operation of the equipment.

### **Arc-Flash**

NEMA member companies support the safe maintenance of electrical equipment and systems. NEMA strongly encourages de-energizing electrical systems before maintenance is performed. For service equipment, this typically involves contacting the utility. In order to support an electrical safety program in the workplace, it may be necessary to perform an arc-flash study. Although NFPA 70E provides tables for determining the level of personal protective equipment (PPE) required, it should be recognized that these tables were developed for use only within specific system parameters, and that an arc-flash study would provide more accurate guidance for PPE selection. The arc-flash study provides the necessary information in order to establish the level of PPE needed for each specific location of the electrical system.

### **The NEC and NFPA 70E**

The 2002 *National Electrical Code* (NEC) introduced a new requirement in Article 110.16, which establishes a field-marking requirement to warn qualified persons of potential electric arc-flash hazards. This requirement is driving awareness of the need to perform an arc-flash analysis as a component of an electrical safety program as outlined in NFPA 70E.

The awareness of potential arc-flash hazards has advanced electrical safety by causing the industry to review electrical safety programs and electrical safety training. Driven by NFPA 70E and the review of company safety programs, many companies are now performing fault current studies, which are necessary even to properly use the tables in NFPA 70E within their specific system parameters. The next logical step is to collect overcurrent device information and determine the

potential arc-flash hazard and PPE requirement by calculating the incident energy.

### **The Utility's Role**

The increased number of arc-flash studies being performed by industry and consultants is driving the need for information that has historically been outside of the responses provided by the utility. The foundation for a proper arc-flash study includes having access to the following accurate information from the utility:

- The actual available short circuit current for the existing installation.
- The parameters or settings for the final utility overcurrent protective device.

It should be noted that a conservative fault current value (which historically has been provided by utilities) may not provide the "worst case" arc-flash condition. In many cases, calculations of arc flash hazard based on conservatively high available fault current values can underestimate the actual flash hazard at circuit locations. Therefore, having the actual available fault current is necessary in order to ensure appropriate PPE. Accurate overcurrent protective device parameters are also necessary to establish accurate arc-flash calculations to ensure appropriate PPE. Keep in mind that appropriate PPE is typically required even for the process of placing the electrical equipment in an electrically safe working condition.

NEMA believes that utilities will recognize the need to have a system in place to provide, upon request, the necessary information for an arc-flash analysis. It will also be recognized that the utility's protective device plays a significant role in the potential arc-flash hazard at the service. The utility distribution system is periodically changing due to transformer replacement, temporary or permanent feeder reconfiguration, voltage conversion or substation changes. These changes can impact the protective devices, available short circuit current, and the resulting potential arc-flash hazard.

NEMA considers that utilities will understand their customer's needs and will thus ensure that customer service policies and procedures are in place that will support customer requests for the utility information needed to perform a proper arc-flash analysis. This will support accurate PPE requirements to protect qualified workers from potential arc-flash hazards. We suggest that the utility procedures will also need to consider a "notification system" to alert customers in the event that a utility system change impacts locations that are known to have requested information on the magnitude of the available short-circuit current.

Finally, NEMA encourages electrical equipment be de-energized and subsequent maintenance be performed in accordance with NFPA 70E. Work on service equipment may require the utility to de-energize the service conductors feeding the service. NEMA recommends users contact their local utility to arrange a power outage before working service equipment.