

Common Myths and Misunderstandings about Arc-Flash Hazard Assessments

Misconceptions about Incident Energy Analysis (Arc Flash Studies) are quite common and can decrease the effectiveness of Assessments and actually lead to more electrical hazards. Many of these misconceptions are due to a lack of thorough understanding of the laws and standards that apply to Incident Energy Analysis.

OSHA (Occupational Safety and Health Administration) may rely on multiple consensus standards in regards to their regulations, which may vary from state to state. Furthermore, different methods are used to calculate and quantify Arc-Flash hazards. It is of utmost importance that when deciding to do an Incident Energy Analysis, the services provided by a service company and the necessary actions needed to be OSHA compliant are fully understood. Thus paper is intended to debunk the various misconceptions about Incident Energy Analyses and clarify what OSHA and NFPA actually require.

OSHA and NFPA 70E require a complete electrical hazard assessment, which includes an Incident Energy Analysis. The degree to which a worker may be exposed to potential Arc-Flash Hazards and the type of Personal Protective Equipment (PPE) is required to protect workers from the heat, light, and blast associated with an Arc-Flash accident are all determined by an Incident Energy Analysis.

Myth One: OSHA does not enforce NFPA 70E for Arc-Flash and electrical safety compliance.

OSHA 1910 Subpart "S" (1910.301 to 1910.399) specifies Electrical Safety-related work practices. The latest edition of NFPA 70E is also being used as a guideline for enforcing OSHA electrical safety rules. The 1970 Occupational Safety and Health Act stipulate that employers must provide their employees with a working environment free of any recognized hazards that could potentially result in death or serious injury.

The NFPA developed NFPA 70E, Standard for Electrical Safety in the Workplace, in an effort to help employers meet OSHA regulations. NFPA 70E is used by OSHA compliance officers to evaluate Arc-Flash Hazards and minimize or prevent Arc-Flash accidents. OSHA 1910.132(d) and OSHA 1910.335(a)(1)(i) require employers to assess their working environment and identify electrical or

any other hazards that are present, inform employees of the presence of any such hazards, provide employees with PPE, and train employees on the proper use of protective equipment.

OSHA 1910 Subpart “S” also mandates that employers to establish an electrical safety program which covers safe electrical design, safe electrical maintenance requirements, and safe work procedures for special electrical equipment. According to OSHA 1910.332, employers must train and qualify their employees in safe work practices and standard operating procedures to reduce the hazards and increase worker safety. However, OSHA regulations are written in general terms, rather than specific details as to how regulations may be met.

Furthermore, OSHA has stated that employers must provide workers with appropriate PPE as per the OSHA 29 1910.132 (h)(1) PPE payment requirement, i.e., (PPE) used to comply with this part, shall be provided by the employer at no cost to employees. Paragraph (h) became effective February 13, 2008, and employers must implement the PPE payment requirements no later than May 15, 2008

How to implement an electrical safety program, how to establish safety related work practices, how to establish methods and use mathematical formulas to evaluate electrical shock and Arc-Flash Hazards, and how to select and use electrical shock and Arc-Flash PPE are all addressed in NFPA 70E. The necessary types of safety training and how workers can become qualified are also specified in NFPA 70E. OSHA recognizes NPA 70E as a national standard and it must be followed in order to be OSHA compliant.

Myth Two: Per IEEE 1584 – Guide for Performing Arc-Flash Hazard Calculations, assessing equipment 240 volts and less is unnecessary.

OSHA regulations and NFPA 70E standards mandate that all equipment operating at 50 volts and higher must be tested for electrical shock and potential Arc-Flash hazards. The Institute of Electrical and Electronic Engineers (IEEE) has published IEEE 1584, which provides a process of calculating the amount of potential Arc-Flash incident energy at various working distances from exposed live conductors. IEEE 1584 helps to establish the Hazard Risk Category and PPE requirements of NFPA 70E. In NFPA 70E Annex D, the IEEE 1584 calculation methods are referenced.

IEEE 1584 was revised in 2018. The old exemption that states, “Equipment below 240 V need not be considered unless it involves at least one 125 kVA or larger low-impedance transformer in its immediate power supply.” It has been



replaced with “Sustainable arcs are possible but less likely in three-phase systems operating at 240 V nominal or less with an available short-circuit current less than 2000 A.” This refers to the potential for incident energy exposure under these circumstances as observed during testing.

The statement above only refers to incident energy calculations. Employers are still responsible for the assessment of all equipment operating at 50 volts and higher in the facility for other possible electrical dangers, such as shock and overload conditions which may lead to fires, electrocutions, and/or other hazards.

OSHA 1910.303(g)(2), OSHA 1910.333, and NFPA 70E Articles 110.1(H)(3)(c), specify that all equipment operating at 50 volts or higher must be assessed for the possibility of electrical shock (establishing protection boundaries and PPE) and potential Arc-Flash hazards (Hazard Risk Categories, incident energy levels, flash protection boundaries and PPE). Supplementing these requirements, Article 110.16(A) of the National Electrical Code (NEC) mandates that all equipment that may be worked on while energized be identified and marked with the proper Arc-Flash warning label. See figure 1.

Myth Three: *Beyond the Motor Control Center, it is no longer necessary to check equipment for Arc-Flash Hazards.*

Just because the Motor Control Center (MCC) is the final access point of power for motor loads, it doesn’t mean that there is no need to assess any other loads which are fed from the MCC. This misconception has the potential to cause a very serious and dangerous situation.

For example, quite often a MCC to feed a 277/480 volt power panel or a 480/120-240 volt transformer that feeds an additional panel. Every panel, switchboard, or industrial control panel that is fed from a Motor Control Center must be assessed for Arc-Flash and shock hazards in order to be in accordance with OSHA and NFPA regulations. This is critical because, if a fault were to occur, the motor loads at the MCC can contribute to the available fault current. Both OSHA 1910.303(g)(2) and NFPA 70E Article 110.1(H)(3)(c) require an *electrical* shock hazard evaluation for all energized parts operating at 50 volts and higher in addition to potential Arc-Flash hazards.

In order to effectively warn workers of potential Arc-Flash and electrical shock hazards, NEC Article 110.16 and NFPA 70E Article 130.5 (H) all mandate that all industrial control panels, motor control centers, switchboards, panel boards, meter socket enclosures and disconnect switches or circuit breakers that may be inspected, modified, serviced or otherwise maintained while energized, must be identified and prominently marked.

In Conclusion:

One must remember that Arc-Flash Hazard Assessments are absolutely necessary. OSHA and NFPA 70E require Arc-Flash Hazard Assessments as a part of an Electrical Hazard Assessment. In order to have a fully comprehensive electrical safety plan, Arc-Flash Hazard Assessments must be made. Employers are required by OSHA and NFPA to identify any and all possible workplace electrical hazards, reduce or eliminate these hazards, train and qualify their employees, and provide them with PPE of sufficient quality to protect them from all hazards. OSHA and NFPA 70E can help employers meet the safety requirements for their workers and make their facility more productive.

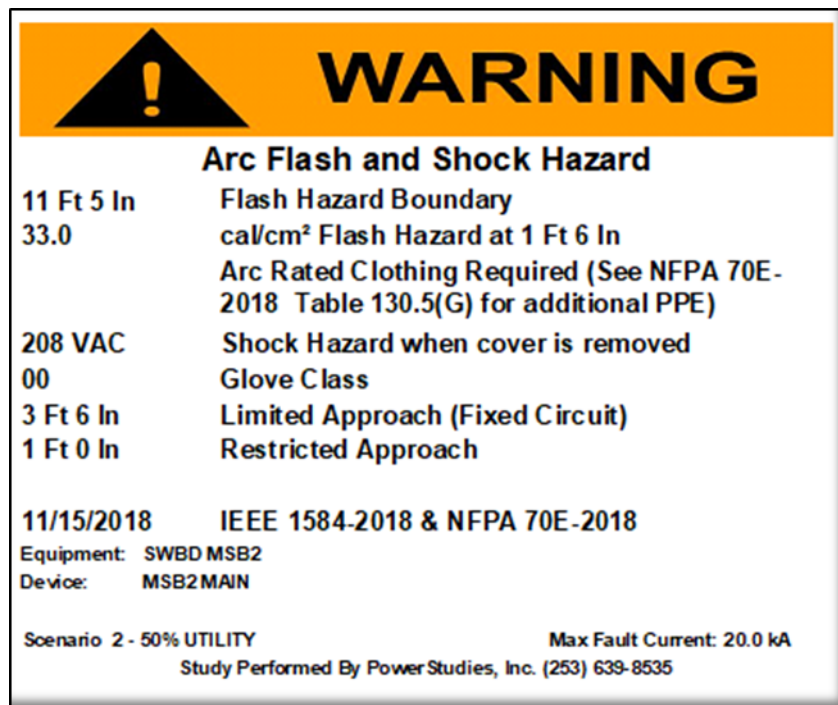


Figure 1 – Typical Arc Flash Warning Label