



## **Below is an outline of our Standard Services...**

Our goal is to reduce the Hazards in your plant to an HRC #0 or HRC #1. We accomplish this through adjustment of circuit breaker settings, change out of fuse size/types or installation of new current-limiting fuses. Our standard fee always includes recommendations for Arc Flash Reductions and adjustment of breakers.

### **1. Typical Scope Boundaries**

- ☛ We include Transformers, Switchgear, Panelboards, Motor Control Centers (MCCs), and Bus Duct from the incoming Utility Service down to and including 240/208 volt panels with the following note: As stated in IEEE 1584 and per Note 3 of Table 130.7(C)(9)(a) of NFPA 70E, we do not include 240 volt or lower panels supplied by transformers lower than 125 KVA (<10,000 Amps Short Circuit). For these panels, we provide you with generic PPE Level #0 warning labels.

### **2. Field Data Collection Services**

- ☛ We will travel to your site to walkdown your plant electrical distribution system to gather the following types of data:
  - Breaker/Relay Trip Settings
  - Fuse Size/Types
  - Panelboard Bus Withstand Ratings
  - Overcurrent Device Interrupting Ratings
  - Transformer Nameplates
  - Primary feeder cable sizes/types/lengths
- ☛ In some cases, it may be necessary to schedule a plant outage to obtain certain data, such as medium voltage fuses or overhead bus plugs that are inaccessible during production.

### **2A. Field Data Collection Sheets (In lieu of Item 2)**

- ☛ We will provide you with data sheets so that you can collect the data.

### **3. Motor Load Data**

- ☛ We need connected motor load data for each MCC or panel.
- ☛ We can either obtain this information from existing drawings or you will need to provide a listing of motor loads and connected horsepower.

### **4. Utility Data**

- ☛ We will contact your Utility Company to determine source impedance, available fault currents and nearest upstream overcurrent device settings.

### **5. Short Circuit Analysis**

- ☛ We will determine maximum fault currents (3-phase momentary, 3-phase interrupting, and line-to-ground faults) at each piece of equipment.
- ☛ We will compare the maximum calculated fault current with manufacturers' ratings to determine if there is any equipment that is overstressed or underdesigned for the installed application.
- ☛ The results of the short circuit analysis will be shown on a one-line diagram as well as in tabular form.
- ☛ We will provide a written report stating assumptions, findings, and recommendations.

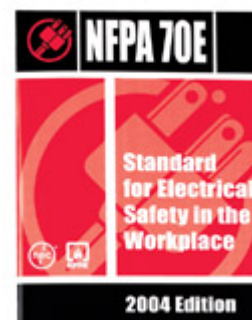


## 6. Coordination Analysis

- ☛ We will check that transformers, cables and major panels are properly protected by overcurrent devices.
- ☛ We will check for coordination between overcurrent devices and make recommendations to try and provide selective coordination (i.e. we want the nearest upstream overcurrent device to clear the fault first).
- ☛ We will provide a spreadsheet report showing Protective Device Settings.
- ☛ We will provide Time Current Curves printed in full color.
- ☛ We will provide a written report stating assumptions, findings, and recommendations.

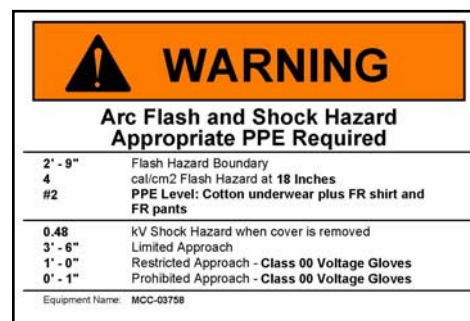
## 7. Arc Flash Hazard Analysis

- ☛ We will use the results of the Short Circuit Analysis and Coordination Analysis to conduct an Arc Flash Hazard Analysis based on NFPA 70E-2004 and IEEE1584.
- ☛ Our results will show 3-phase bolted fault current, estimated arcing fault current, clearing time, incident energy level (cal/cm<sup>2</sup>), Arc Flash Boundary, PPE Level/Clothing Class.
- ☛ In addition, our report will show shock hazard information including voltage glove class information and the following approach distances as defined in NFPA70E: limited, restricted, and prohibited.
- ☛ We will provide a spreadsheet report showing the above results.
- ☛ We will provide a one-line diagram showing the Arc Flash Hazard information at each bus in the system.
- ☛ We will provide a written report stating assumptions, findings, and recommendations.



## 8. Arc Flash Hazard Warning Labels

- ☛ We will print custom 4"x6" Arc Flash Hazard Warning Labels. We use Brady Polyester die-cut labels printed using Thermal Transfer resin.
- ☛ We will print generic 3"x3" (PPE #0) Arc Flash Hazard Warning Labels for each 240 or lower panel fed from a transformer less than 125 KVA.
- ☛ We will print MCC generic 2"x3" Arc Flash Hazard Warning Labels. These labels will be installed on the vertical wireway of each MCC.
- ☛ We can install the labels or the customer can do this.



## 9. Field Adjustments to Circuit Breakers

- ☛ Some of our recommendations may be to modify trip settings of adjustable trip circuit breakers and overcurrent protective relays and in some cases we may suggest replacing fuses with different sizes. We can make these recommended changes on-site.

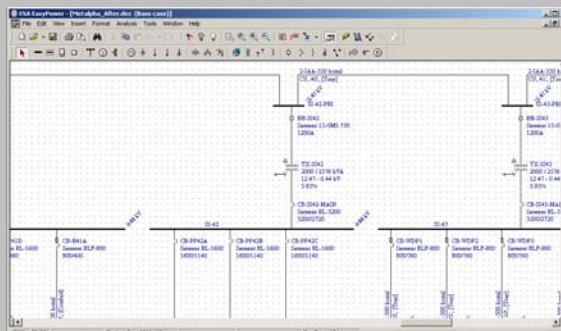




## Deliverables

1. **Comprehensive Report**
  - ☛ Hard Copy – 3 Ring Binder – Printed using Color Laser
  - ☛ Electronic Version in Adobe PDF
2. **CD-ROM**
  - ☛ Contains all project files and manufacturer device information
3. **Arc Flash Hazard Warning Labels**
  - ☛ Custom printed using thermal transfer printer and provided on rolls
4. **Electrical System One-Line Drawing**
  - ☛ Hard Copy – Plotted 24"x36", Black/White, folded and inserted in 3-ring binder
  - ☛ Electronic Version in Adobe PDF
  - ☛ Electronic Version in AutoCAD DWG/DXF
5. **Electrical System 3-Phase Fault Currents One-Line Drawing**
  - ☛ Hard Copy – Plotted 24"x36", Black/White, folded and inserted in 3-ring binder
  - ☛ Electronic Version in Adobe PDF
  - ☛ Electronic Version in AutoCAD DWG/DXF
6. **Electrical System Arc Flash Hazards One-Line Drawing**
  - ☛ Hard Copy – Plotted 24"x36", Black/White, folded and inserted in 3-ring binder
  - ☛ Electronic Version in Adobe PDF
  - ☛ Electronic Version in AutoCAD DWG/DXF

\*\*NOTE: If the customer does not have any one-line drawings, our most economical solution is to create the plant one-lines in EasyPower or SKM and then export to AutoCAD for plotting/printing. This is the lowest cost option. We can also create the one-line drawings from scratch in AutoCAD, however, this will require additional costs.



## In-house Engineering Software

1. **AutoCAD – Current Release**
2. **ESA, Inc. EasyPower Software**
3. **SKM Analysis, Inc. Power Tools**

\*\*NOTE: If customer does not have a preference, our default engineering software is ESA, Inc. EasyPower Software.

