7 things to look for in an arc flash study

1. Executive summary
2. One-line diagram
3. Short circuit analysis
4. Protective device coordination study
5. Settings table
6. Arc flash incident energy analysis
7. Input data used in the analysis

The threat of arc flash is real, and the consequences of an event can be devastating. The initial step in addressing this risk is to have an arc flash study performed, but beware - not all studies are equal, and an inferior study unnecessarily endangers your employees and your business.

To gauge the quality of a study, first, verify that the study will be performed by experienced engineers. Inquire about their education, licenses and experience.

Then, ask about their ability to offer a turnkey solution after the study. Can they train employees on how to interpret the study, read warning labels, choose the correct PPE and properly maintain electrical equipment? Do they have the ability to help you develop an effective electrical safety program? Can they provide products and services to help reduce high incident energy identified in the study?

Finally, ask for a sample of the final report. What information will be included, and will it provide recommendations to improve safety in your facility? Compare the sample report against the following checklist to ensure you’ll get comprehensive and actionable information.
1. Executive summary
A synopsis of the key findings and recommendations to improve the safety and operation of the power system.

Recommendations may include replacement of over-dutied equipment or methods to reduce incident energy at critical work locations. Use this summary as a roadmap for improvement after the study has been completed.

2. One-line diagram
A model of the entire electrical system which forms the basis for the study.

It shows how the equipment is configured and connected, but many times, a facility one-line diagram doesn’t exist or is incomplete. Power systems engineers who perform the arc flash study should first validate, or create, a current one-line diagram. Mark this up if changes are made to your electrical system which then makes it easy to update the study.

3. Short circuit analysis
Calculates available fault current for each piece of electrical distribution equipment in your facility.

This study will determine the first of three factors that are used to calculate incident energy: available fault current. First-rate studies will compare the fault current to the equipment ratings to identify over-dutied equipment, a common occurrence in older facilities with upstream equipment that has been upgraded or modified.

4. Protective device coordination study
Modeling each protective device and its recommended set points.

This study will determine the second of three factors that are used to calculate incident energy: clearing time. The clearing time reflects the amount of time it will take for each upstream protective device to clear a potential arcing fault. The report should include time current curves that illustrate the degree of system selectivity that is achieved. This is necessary to verify that only the portion of the power system experiencing a fault is de-energized and nuisance tripping is eliminated.
5. Settings table
A list of recommended settings for circuit breakers and relays.

Reference this table to ensure that equipment is set according to the study recommendations. As some settings may be changed only during an outage, make this table easily accessible for quick reference.

6. Arc flash incident energy analysis
Used to generate arc flash warning labels showing nominal system voltage and arc flash boundaries, as well as available incident energy and/or PPE category.

In a comprehensive study, this section features the results in tabular format, including the available fault current, clearing time and working distance used to calculate the incident energy at each equipment location. It should include a discussion of the operating scenarios considered, including normal utility operation and alternative sources of power such as diesel standby generators. Refer to this section to learn how to interpret the results based on the most current version of NFPA 70E.

7. Input data used in the analysis
A reference to the data upon which the study was based.

This data includes things such as cable, utility, motor and generator information. Reference this data when updating the study in the future.

If the study you’re considering doesn’t provide all of the information detailed above, you may be compromising arc flash safety by not having all of the relevant data available to you.

Eaton has one of the largest engineering services organization in the U.S., can provide a turnkey arc flash safety solution. We would welcome the opportunity to review your existing study or talk with you about a new one.

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