



D.L. STEINER, INC.
ENERGY CONSULTANTS AND ENGINEERS

Arc Flash Hazard Safety Program

*Your Turnkey Solution for Mitigating
the Hazards of Arc Flash Incidents
in the Workplace*



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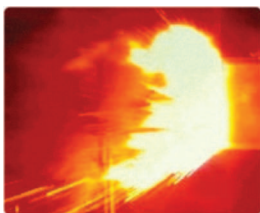


You *Can* Protect Against Arc Flash Incidents

With today's powerful, complex electrical distribution systems, shock isn't the only danger facing those who work on or around these systems. Another equally severe hazard is that of *arc flash*.

What Is an Arc Flash?

An arc flash is a short circuit occurring via the air space between electrical devices that results in a sudden, explosive, totally uncontrollable electric arc. During an arc flash incident:



- There is a blinding flash of light
- The temperature inside the flash soars to as high as 35,000° in a millisecond, creating a self-feeding plasma that continues to grow in intensity
- A blast wave with dynamite-level force can occur. The accompanying sound often exceeds 160 dB
- Vaporized metal and shrapnel from disintegrating equipment is expelled at over 700 mph

Even simple actions such as opening an electrical cabinet door, dropping a tool, or taking a meter reading can trigger an arc flash—and its deadly results!

The High Cost of Arc Flash Accidents

For the person—and the company—unprepared for it, the consequences of an arc flash can be shattering:

- In addition to death or serious injury of personnel, facilities are destroyed and operations interrupted.
 - The cost of litigation, insurance claims, and regulatory fines can reach astronomical levels.
 - The emotional toll and damage to a company's good name are incalculable.
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Electrical accidents are over 20 times more likely to be fatal than other types of workplace injuries. And while arc flashes aren't as common as shock incidents, they are far more likely to result in death or serious injury. According to statistics by the Institute of Electrical and Electronics Engineers (IEEE), 77% of all recorded electrical injuries during a 10-year period were due to arc flash.

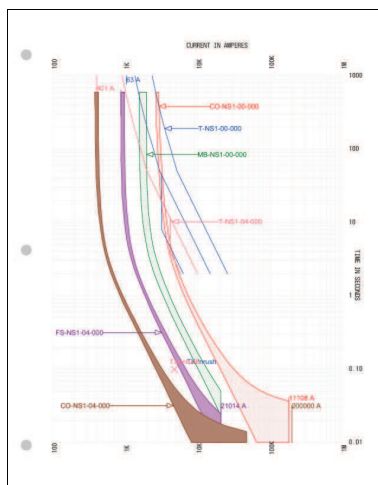
D.L. Steiner's Arc Flash Safety Solution

Now, with D.L. Steiner's *arc flash hazard safety program*, your company can defend itself against the devastating consequences of arc flash incidents. Our system offers you a *turnkey* electrical safety solution that:

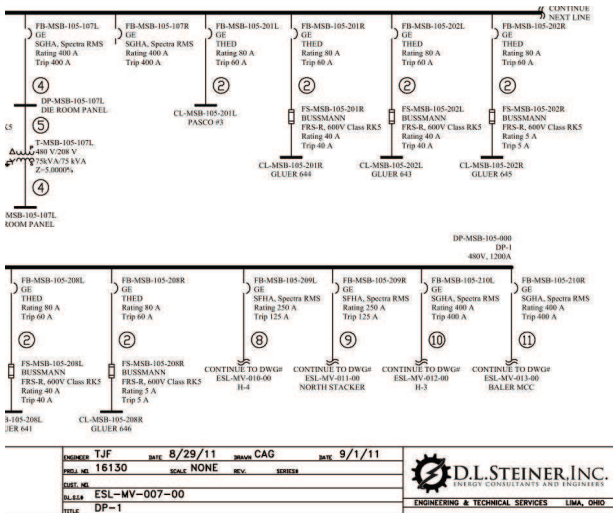
- Protects your people and equipment.
- Meets the mandates of the OSHA General Duty Clause and NFPA standards.*
- Safeguards the long-term future of your company!

It consists of 10 standard and recommended project phases, each resulting from years of experience analyzing *and solving* arc flash hazard problems for clients across a wide range of industries.

Phase 1, Data Collection (NEC Safety Audit)—A detailed gathering of all electrical distribution system information pertinent to arc flash hazard analysis. Obtained from existing facility drawings, nameplates, and the electrical equipment, itself.



Phase 2, Short Circuit (SC) Study—An examination of the short circuit current in each bus and branch of the electrical distribution system. Key for determining if the system's protective devices are properly sized for the available fault current.



Phase 3, Protective Device Coordination (PDC) Study—An investigation of how well protective devices are coordinated to isolate equipment faults and to minimize the effects of a short circuit on the rest of the electrical system. Critical for isolating problems and minimizing disruptions.



Phase 4, Arc Flash Hazard (AFH) Analysis—An evaluation of how susceptible the system is to the hazards of shock, arc flash, and arc blast. Based on data resulting from the short circuit and protective device coordination analysis to assure accuracy.

Phase 5, Single-Line Diagram (SLD) and Study Report—(1) An accurate, up-to-date visual representation of the electrical distribution system and (2) a detailed written evaluation of the electrical system that includes all data resulting from the system study *plus* recommended actions for mitigating system issues.

* In 29 CFR § 1910.333 of its General Industry Standards, OSHA mandates that “Safety-related work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts, when work is performed near or on equipment or circuits.” Here, “other injuries” also refers to those occurring due to arc flash.

To define what this means, OSHA relies on *NFPA 70E Standard for Electrical Safety in the Workplace*. D.L. Steiner’s arc flash hazard safety program fully complies with this important electrical safety standard.



 WARNING	
480 VAC	LEVEL 1
<u>Shock Hazard</u> 0 Glove Class 42 Inches Limited Approach 12 Inches Restricted Approach	<u>Arc Flash Hazard</u> 2 Feet 4 Inches Arc Flash Boundary Minimum Arc Rating of 4 cal/cm ² at 18 Inches Working Distance 
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Phase 6, Label Creation and Installation—

Durable, UV-resistant vinyl safety labels, detailing the shock and arcing hazards of system

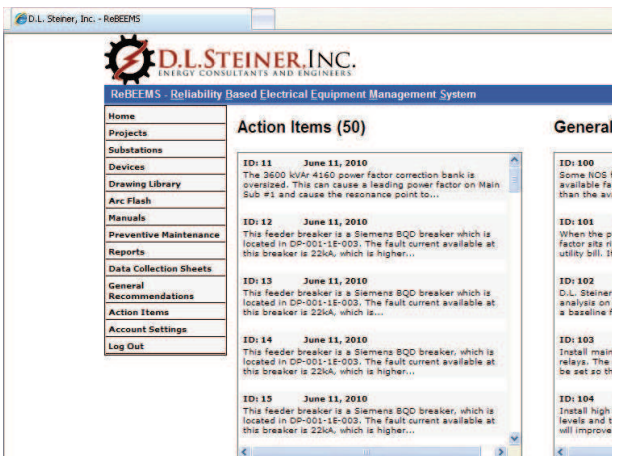
devices. Each identifies a device, its hazard level, and the PPE (personal protective equipment) personnel should use. Everything people need to work safely!

Phase 7, Arc Flash Mitigation and PPE Recommendations—

Professional, practical guidance in (1) system changes/upgrades to mitigate the potential for arc flash incidents to occur and (2) the PPE clothing and equipment personnel should use when working on or around hazardous electrical equipment.

Phase 8, Electrical Safety Training—In-depth NFPA 70E electrical safety training for qualified personnel, as well as basic NFPA 70E electrical safety training for unqualified personnel. Qualified training delivered live at your facility or via webinar. Unqualified training delivered on DVD (the DVD is also great for qualified personnel refresher training).

Phase 9, Safety Program Development—A comprehensive NEC-centered electrical safety program (ESP) that complies with OSHA regulations and consensus industry standards for electrical safety. Program includes recommendations for mitigating safety



D.L. Steiner, Inc. - ReBEEMS

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ReBEEMS - Reliability Based Electrical Equipment Management System

<ul style="list-style-type: none"> Home Projects Substations Devices Drawing Library Arc Flash Manuals Preventive Maintenance Reports Data Collection Sheets General Recommendations Action Items Account Settings Log Out 	<h3>Action Items (50)</h3> <p>ID: 11 June 11, 2010 The 3600 kVAr 4160 power factor correction bank is oversized. This can cause a leading power factor on Main Sub #1 and cause the resonance point to...</p> <p>ID: 12 June 11, 2010 This feeder breaker is a Siemens BQD breaker which is located in DP-001-1E-003. The fault current available at this breaker is 22kA, which is higher...</p> <p>ID: 13 June 11, 2010 This feeder breaker is a Siemens BQD breaker which is located in DP-001-1E-003. The fault current available at this breaker is 22kA, which is higher...</p> <p>ID: 14 June 11, 2010 This feeder breaker is a Siemens BQD breaker, which is located in DP-001-1E-003. The fault current available at this breaker is 22kA, which is higher...</p> <p>ID: 15 June 11, 2010 This feeder breaker is a Siemens BQD breaker, which is located in DP-001-1E-003. The fault current available at this breaker is 22kA, which is higher...</p>	<h3>General</h3> <p>ID: 100 Some NOS... available fa... than the av...</p> <p>ID: 101 When the p... factor sits... utility bill...</p> <p>ID: 102 D.L. Steiner analysis on a baseline f...</p> <p>ID: 103 Install main relays. The be set so th...</p> <p>ID: 104 Install high levels and t will improve...</p>
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deficiencies or compliance issues observed during program development.

Phase 10, EPPM Program (ReBEEMS)—A formal electrical predictive/preventive maintenance (EPPM) program, as recommended by NFPA 70B, 70E, and NETA, delivered through ReBEEMS, D.L. Steiner's Internet-based EPPM application (previous page). ReBEEMS promotes effective EPPM by making all electrical system information (single lines, study reports, test records, etc.) available online, 24/7/365, via any device with a Web browser.

Implement a Complete Arc Flash Safety Solution

Effective arc flash hazard analysis requires a comprehensive approach by skilled professionals. At D.L. Steiner, we address *every* aspect critical to true arc flash hazard safety—from data collection to equipment labeling to final report preparation and electrical safety training. All program tasks are performed by experienced engineers, technicians and support personnel. And each program undergoes a final review by a licensed PE to ensure accuracy and thoroughness.

The result? You implement a *complete answer* for mitigating the hazards of arc flash incidents in your workplace!

With D.L. Steiner's arc flash hazard safety program, you *can* protect your company from the tragic effects of arc flash hazard incidents. Contact D.L. Steiner *today* and let us show you how!



D.L. Steiner, Inc. • www.dlsteiner.com

Email sales@dlsteiner.com

P.O. Box 1157 • Lima, Ohio 45802

Tel (419) 222-6048 • Fax (419) 222-6170

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