

## Are You Prepared for the New NFPA 70E 2012 Electrical Safety Standard?

By Roger Ford, Safety and Training Coordinator

The Occupational Safety and Health Administration (OSHA) mandates that companies provide an electrically safe workplace for all personnel. To define what this means, OSHA turns to the National Fire Protection Association (NFPA) and its NFPA 70E standard.

NFPA 70E continues to evolve as new thinking on electrical safety is introduced. The latest edition, *NFPA 70E 2012*, has changed significantly from the 2009 edition of the standard, and to help you understand how 70E 2012 impacts your company, D.L. Steiner has prepared this summary of its most notable updates.

**Audits**—NFPA 70E 2012 requires that companies now conduct regular audits of their entire electrical safety program at specified time intervals.

Worker performance must now be audited *at least annually* to verify that qualified workers are complying with 70E standards (*Article 110.2[D][1][f]*).

Formal audits of the company electrical safety program must now be completed on a frequency not to exceed three years (*Article 110.3[H][1]*). This includes fieldwork to verify that the safety program is being followed. If it isn't, training must be changed.

Electrical safety audits and their results must now be documented.

**Electrical Safety Training**—NFPA 70E 2012 contains two important new mandates related to safety training:

- A facility's electrical workers must now undergo retraining in electrical

safety at a minimum of every three years (*Article 110.2[D][3][d]*).

- The documentation for electrical safety courses must now contain course content, as well as the date of the training and the names of the people who were trained (*Article 110.2[E]*).

**Safety Practices**—NFPA 70E includes procedures for managing risks associated with working near electrical energy. Some of these have changed noticeably for 70E 2012.

Previously, NFPA 70E required the *electrically safe work condition*

### NFPA 70E® 2012 Edition

(exposed conductors disconnected from power source, locked and tagged, tested for zero voltage, grounded, if necessary) whenever a worker worked within the limited approach boundary for exposed energized conductors. For 70E 2012, the electrically safe work condition is required, even if energized conductors aren't exposed but the worker interacts with equipment in a way that increases the risk of injury due to an arc flash (*Article 130.2*).

Earlier NFPA 70E editions required an *energized electrical work permit* whenever a worker worked inside the limited approach boundary of live electrical equipment that couldn't be placed in the electrically safe work condition. 70E 2012 requires the permit for work performed within the *arc flash boundary* of exposed energized electrical conductors (*Article 130.2[B][1]*; *Informative Annex J*).

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## Demand Control Options That Save Money

By Ryan Zimmerman, Electrical Engineer

In the previous issue of the *PCC Journal*, we discussed how demand control can help companies lower their utility bills by smoothing out their *electrical demand* (the kW amount of electricity required for operations). This article looks at six great options for setting up an effective demand control program—and eliminating those costly demand charges!

### Option 1: scheduled operations.

Under scheduled operations, all operations are metered to determine their electrical load and then run at predetermined times, with some functions staggered so they don't operate simultaneously. High-demand operations are then run at night, when utilities typically relax their kW demand limits. Scheduled operations often work well in situations where production is consistent from day to day.

**Option 2: manual control.** In a manual demand control system, someone is responsible for monitoring electrical demand (using meters) and shutting down certain equipment when the demand reaches a target level. Manual control is an effective demand control alternative—and one that's fairly economical to implement. But if you decide on a manual system, we recommend also incorporating some type of alarm scheme to alert personnel when facility electrical demand is nearing its limit.

**Option 3: interlocks, load shedders.** Interlocks prevent two or more pieces of high-demand equipment from running at the same time. Load

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## News and Announcements



### D.L. Steiner to Hold NFPA 70E Seminar—

To help companies comply with OSHA's electrically safe workplace mandate (29 CFR §1910.333), D.L. Steiner will be conducting its "The Electrically Safe Workplace" seminar January 26, 2012 from 9:00 A.M. to 1:30 P.M. at the **Dickman Center for Customer Education**, Dickman Industrial and Electrical Supplies, 1991 St. Marys Ave., Sidney, Ohio 45365.

Seminar topics include *the basics of workplace safety, safety-related work practices, and safety-focused task assessment*. Gain the skills and know-how you need to ensure an electrically safe workplace at your company—as well as meet OSHA's strict electrical safety mandate.

The cost of the seminar is \$99.00, which includes a complete copy of the NFPA 70E standard, 2012 edition, and lunch. Seating is limited to 60, and registration closes January 20. Call D.L. Steiner *today* at 419-222-6048 to register! ♦

### Free Energy Assessment Available From D.L. Steiner—

A great way to start 2012 is by getting an accurate picture of your company's energy usage and how you might become more energy efficient. And a great way to do this is with a **free** energy assessment currently being offered by D.L. Steiner.

D.L. Steiner's energy assessment is a CEM-completed engineering study that uses your company's historical energy data, an inspection of your facility, and comparisons with industry averages to identify areas where you can increase energy efficiency and conservation—and save money!

Contact D.L. Steiner at 419-222-6048 to schedule your **free** energy assessment and to request our Pre-Assessment Data Collection Form. ♦

### Prepared for NFPA 70E 2012?

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The 2009 edition of 70E contained a lockout/tagout procedure that permitted electrical workers to de-energize a circuit without applying locks or tags (*Article 120.2[D][1], 2009 edition*). This procedure conflicted with OSHA electrical safety standards and has been removed from 70E 2012.

**Arc Flash Hazard**—In previous 70E editions, *arc flash hazard analysis* included establishing the arc flash protection boundary and selecting the PPE (personal protective equipment) required to work safely in the presence of the arc flash hazard. Under 70E 2012, arc flash hazard analysis includes establishing the *incident energy level at the working distance*, plus establishing the arc flash boundary and selecting PPE (*Article 130.5*).

The default 4' arc flash protection boundary of earlier 70E editions has been removed from 70E 2012. This boundary is now specified in inches for each unique situation and comes from one of two task tables: *Table 130.7(C)(15)(a)* for AC and *Table 130.7(C)(15)(b)* for DC. These tables also list the fault current, clearing time, and working distance of protective devices in the heading of each table section. This eliminates searching table endnotes to verify that a task fits within established limits.

Under 70E 2012, electrical systems of 240 Volts or less with a transformer rated 125 kVA or less *are no longer exempt from the arc flash hazard analysis mandate (Article 130.5)*. For guidance assessing the arc flash hazard of these systems, see IEEE 1584.

**Labeling**—Previously, electrical equipment safety labels could include the information of either incident energy or required PPE level. NFPA 70E 2012 mandates that these labels contain more extensive safety information (*Article 130.5[C]*)—

- *At least one* of the following:
  - (1) available incident energy;

(2) minimum arc rating of clothing; (3) required PPE level; (4) highest HRC (hazard risk category) for the equipment

- Date of arc flash hazard analysis
- Nominal system voltage
- Arc flash boundary

**PPE**—70E 2012 makes significant changes to the way PPE is used:

- The 2\* Category has been deleted.
- *Incident energy calculation method for selecting PPE*—The balaclava (sock hood) must be worn with a face shield if the back of the head is within the arc flash protection boundary (*Article 130.7[10][b][1]*).
- *Incident energy calculation method for selecting PPE*—An arc flash hood must be used if the anticipated incident energy exposures exceeds 12 calories/cm<sup>2</sup> (*Article 130.7[10][b][2]*).
- *Table method for selecting PPE*—The balaclava and face shield must be worn if the task table indicates Category 2 (*Table 130.7[C][16]*).

**New DC Information**—NFPA 70E 2012 includes two new tables for assessing electrical hazards while working with DC voltages.

- *Table 130.4(C)(b)* lists approach boundaries for protection against shock while working with DC electrical conductors or circuit parts.
- *Table 130.7(C)(15)(b)* lists the arc flash hazard risk category classifications of different tasks performed on DC equipment. Previously, NFPA 70E did not cover DC equipment in any detail.

*NFPA 70E 2012* is a major step forward in workplace electrical safety, but it will no doubt raise questions not addressed by the information we've provided. For help interpreting this new standard to ensure your company complies with its mandates, please contact D.L. Steiner. ♦

## Save Energy, Cut Your Operating Costs, and Become More Competitive in 2012

By Dan Steiner, PE, CEM, CDSM; President

Think for a moment about how much your facility pays annually for utilities: electricity, natural gas, etc. Now, think about taking one-fourth of an equivalent amount of money—and *simply throwing it out the window!*

Sure, this notion sounds crazy. But even in today's cost-conscious world, that's still essentially what American business does when it comes to the use of energy dollars. Recently compiled data by the Lawrence Livermore National Laboratory ([www.llnl.gov](http://www.llnl.gov)) shows that nearly one-fourth of the energy consumed by U.S. commercial and industrial firms in 2010 ended up as "rejected"—wasted and nonproductive—energy.

How much benefit would it be if your company could save even a portion of these lost energy dollars? Unless yours is different than most, my guess is significant. For this reason, plus because energy in all its forms isn't getting any cheaper, projects that improve energy efficiency or reduce consumption only make good sense for the firm wanting to be more competitive in 2012.

A great way to cut consumption and save money is to make use of incentives offered by many utilities. Here are a few from the electric utility side:

- AEP Ohio's gridSMART® initiative rebates up to 50% of project costs for improvements like more efficient motors and HVAC equipment. Its Express Program pays up to 100% of costs for small-business energy efficiency projects. There is even a retroactive program with partial rebates for projects completed as far back as January 1, 2009.

As a member of the gridSMART Solutions Provider network, D.L. Steiner will be happy to help you take advantage of these great programs. Give us a call.

- The Efficiency Smart program by American Municipal Power, Inc. (AMP) offers industrial/commercial customers with annual usage of 20,000 to 500,000 kWh rebates for improvements that provide permanent usage reductions. These include lighting, HVAC, motors/drives, compressors, and refrigeration units. AMP also offers a custom program for those who use more than 500,000 kWh/year.
- The Ohio Rural Electric Cooperatives (OREC) offers reimbursement of 50% (up to \$5,000) to its industrial and commercial clients who complete energy audits.

Check with your utility companies or contact D.L. Steiner for the energy efficiency rebates available to you.

Refocusing on the basics is another path to savings. For example, how good is your power factor? Do you have a good control system to help you avoid demand charges? (See Ryan Zimmerman's article, page 1.)

By far the most effective tool for getting more from your energy dollars is the *professional energy audit*. An energy audit inspects and analyzes energy flows at your company to identify where energy inputs can be reduced without negatively affecting output. It prioritizes these to help you know which provide the greatest energy savings. D.L. Steiner offers several different levels of energy audits, depending on your need:

- *Energy assessments*, also known as "walk-through" or "one-day" audits, that (1) compare your facility's current energy consumption with reference standards for similar operations to determine "good," "average," and "bad" performance and (2) identify your facility's most obvious areas of energy inefficiency and waste.



- *Standard audits*, intermediate-level audits that use data collection, interviews, facility/system studies, on-site measurement and testing, and engineering calculations to identify ECMs (energy conservation measures) appropriate for your company and the economic factors related to their implementation.
- *Investment-grade audits* (IGAs) that use in-depth data collection, comprehensive measurement and verification (M&V), and extensive engineering analysis to quantify the risks/rewards of energy projects—especially large capital ones—so stakeholders can be confident of the ROI before committing funds to these efforts.

As a certified energy manager (CEM), I've come to appreciate the value of "measure before doing." The key to a successful energy audit is using M&V techniques that accurately determine how much energy the various initiatives will save. D.L. Steiner conducts our audits according to the International Performance Measurement and Verification Protocol (IPMVP). IPMVP is *the* recognized standard for reliability in energy savings claims.

Regardless of how well your company does on the energy efficiency scale, chances are good its rating could be even better—*maybe by as much as 25%*—for a real boost to your bottom line. Contact D.L. Steiner today for more on how we can help you save energy and reduce your energy costs in 2012. ♦

## Demand control Options

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shedders automatically shut down equipment before the target electrical demand level is reached (shutdown occurs according to a prioritized schedule). Both methods depend on metering for the capabilities they provide. Interlocks and load shedders are less flexible than other demand control options, which may not make them ideal for environments where production operations change frequently. But if you want *guaranteed* electrical demand control, they may be the right choice for you.

**Option 4: PLCs.** Because of their versatility, PLCs can perform a range of demand control functions, from equipment interlocking to complex decision making. Most facilities have an abundance of PLCs, so you may already own all of the equipment you need to implement demand control.

Keep in mind, though, PLCs are not an out-of-the-box solution: they do require custom programming. On the plus side, D.L. Steiner offers complete PLC programming services for demand control applications.

**Option 5: demand control systems.** Demand control systems are typically whole-facility, software- and meter-based energy management applications that can be as extensive and integrated as you care to make them. With a demand control system, you can control *every* aspect of energy usage at your facility, not just electrical demand. Demand control systems can be expensive, but their capabilities make them worth every penny.

**Option 6: special equipment.** Generators and adjustable speed drives (ASDs) can help you avoid demand charges by providing as-needed auxiliary power or by flattening out the power spikes that lead to exceeding

the demand limit. The expense of these systems is often offset by what that save you over time.

With the right demand control system, you *can* get rid of demand charges and significantly lower your facility's electric bills—but the key is picking the best option from all the available alternatives. For assistance in identifying your ideal demand control solution, contact D.L. Steiner. ♦

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