

# MIND YOUR SAFETY EB January 2008

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By Dave Smith NFPA 70E is an American standard for electrical safety in the workplace and is being adopted across Canada and internationally. (CSA is developing a Canadian equivalent, CSA Z462, which is scheduled for completion this year.) Disparate provinces are adopting NFPA 70E at different speeds and in different ways; some provincial legislation refers to protecting workers from flashover or arc flash while other legislation speaks to protecting workers from recognized hazards. NFPA 70E is designed to protect workers in two significant ways: 1. by restricting live work to testing, troubleshooting, adjustments and data gathering only, and; 2. by suiting up workers in voltage-rated and flame-resistant PPE that is equal to the maximum voltage and arc flash hazard when working on or around exposed, energized equipment. The first point is a huge change, as the ultimate goal is to eliminate live work altogether. Other than electricians, few people are really aware of how much work in Canadian industry is done live so as not to interfere with production. Many articles on the subject reference an American Occupational Safety and Health Administration statement, which says financial considerations are an unacceptable reason for performing live electrical work. While an admirable position, it's largely impractical; with the electrical design of many facilities, the entire production process would have to be stopped (unless the work could be scheduled to coincide with a production stoppage, but this would be difficult in a 24/7 facility). Especially hard hit will be electrical contractors. Electricians have been doing live work since Edison lit up Menlo Park in 1879. Should a contractor tell his client there will have to be a production stoppage for what has traditionally been an accepted live task, it's very likely the client will merely find another contractor. As an electrician and an electrical safety consultant as well as the father of an electrician I am in complete support of NFPA's initiative. At the same time, psychologist Abraham Maslow's research into the Hierarchy of Human Needs clearly shows that fighting for our livelihoods is almost a primal instinct, and doing a traditional job live because you are a small contractor feeding your family, or expecting someone else to because you need to keep your job, is going to continue. A simplistic solution would be to follow NFPA 70E's second point—that of suiting up workers in voltage-rated and flame-resistant PPE—thereby enabling electrical workers to continue to do certain tasks both live and safely. Let's examine that option. Pages 29-31 of NFPA 70E contain eight sections that list typical tasks an electrical worker has traditionally done live and the PPE required were live work to continue. The columns list the individual task, the Hazard/Risk Category of that task (from which the required flame-resistant PPE can be selected), and whether or not voltage-rated (insulated) gloves/tools are required. For example, the top section on page 29 identifies work done on "Panelboards rated 240V and below". One task identified in this section is "Remove/install a circuit breaker". The electrician in this case would need to wear FR PPE suitable for Hazard/Risk Category 1, which is a maximum 4-cal exposure. It would seem straightforward, then, to adopt NFPA 70E, provide FR PPE to your workers and have them use the tables when doing live work. What prevents you, however, are Notes 1, 2, 4 and 5 at the bottom of page 31, which restrict the use of these Tables within the parameters of each Note. For instance, Note 1 restricts the above task to a panel of no more than 25,000 amps of available short circuit current (SCC) that is protected by a fuse or breaker with a maximum of two cycles fault clearing time. Who is going to know this SCC information? If you're a plant maintenance electrician, you should be able to determine this information for the panel you're working on, but if you're an electrical contractor working for a variety of clients, good luck! And if the panel is fed from a pole top or locked vault transformer, you might have to wait weeks for a utility worker to climb the pole or open the vault so you can locate the needed transformer and fuse data information. It is highly unlikely you will ever have more than 25kA available on a 240V panel, but if you don't know, then you cannot use NFPA 70E's table. As for the clearing time, who would know that off-hand? Fuses and moulded-case circuit breakers should open in less than two cycles, but an air circuit breaker will not. Were the panel in the downtown core of a major city, supplied from a network of transformers, the clearing time would be the time it takes for the fault to burn itself open. Practically, 240V systems do represent a lower arc flash hazard, but should a worker perform any task—including testing, troubleshooting, adjustments and data-gathering—without knowing this data, he could be in violation of the standard. Were an accident to happen, he and his company would be in violation of federal and provincial safety standards. Should the task location exceed the Note limitations of 1, 2, 4 or 5, then Article 130.7(C)(9)(a), top left of page 29, says that an arc flash hazard (AFH) analysis is required—an engineering study requiring the completion of a short circuit study, followed by a protective device study. The results are used to determine the incident energy in cal/cm<sup>2</sup> at every contact point throughout the system so that the proper FR PPE can be selected. The final step is to label all equipment with all the critical electrical safety information. The cost of these analyses can range from \$3000 to more than \$200,000. Many well-meaning proponents of NFPA 70E insist that it is easy to use (i.e. "if you have not had an AFH analysis done, just use the tables"), but they overlook the fact that you cannot use the tables without access to the technical information required by the Notes I've described above. All electrical contractors will have to adopt this standard in unison; otherwise it gives an unfair competitive advantage to anyone who continues to work energized. Our electrical contractor associations need to collectively get on board and urge their members all across Canada to refuse to do any live work. Once this starts, the movement will slowly spread to all contractors. NFPA 70E is a great standard, driving important and long overdue changes that will keep our children and friends alive and unscathed. However, our regulators and associations need to start driving home the message that every facility should have an AFH study done. This is an unwelcome message, but one that needs to be sent. Implementing NFPA 70E carries an enormous cost to owners and shareholders, but it's mainly a one-time cost. When it is done, we'll have much safer facilities and work practices leading to fewer accidents, injuries and misery. At recent conferences I've attended I heard many dire warnings about the liability to which supervisors and others could be exposed should they choose not to adopt and follow NFPA 70E. These warnings are always packaged in terms of provincial and federal charges, and fines, lawsuits, legal costs, etc. While this is true, society should recognize that we're in a transition phase, and that we should have a one-year moratorium on any criminal charges while industry implements the standard. It's a difficult standard to implement, after all, and punishing individuals and companies during

this time of transition makes about as much sense as a police officer giving you a ticket on a highway with no signs. Until next time, be ready, be careful and be safe. Dave Smith is president of CANADA TRAINING GROUP and has been providing consulting services to industry since 1980.