Workplace Safety
ACADEMY



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Six Signs That Your Electrical Job Site Isn't Safe

As part of a facility maintenance staff, understanding these often-missed cues is key to keeping you safe.

by Mark Lamendola

Key Highlights

- Missing bolts on panel covers can compromise arc blast containment, flame spread prevention, and enclosure sealing, posing serious safety risks.
- Piled boxes under busways block airflow and insulation, increasing fire hazards and risking contact with energized components.
- Unused openings in enclosures violate codes and reduce safety, making enclosures less effective as barriers against accidental contact or contamination.
- Gaps in raceway runs can disrupt grounding paths, leading to potential electrical faults and equipment damage.
- Cabling draped over raceways indicates poor workmanship and can cause electrical faults or safety hazards if not properly managed.



A consulting engineer, contract electrician, thermographer, or other outside expert entering a client facility needs to quickly assess the general safety level and the condition of specific equipment. If you are part of the facility staff and you work in maintenance, heeding these danger signs (and resolving the identified problems) is crucial because you are exposed every day.

Among many things to look for, these are arguably the top six:

1. **Bolts missing from panel covers.** It may seem like the manufacturer used way too many bolts. It takes only four to hold the cover on, so "correcting" the bolt count to make maintenance more efficient means not putting all of them back. The problem with this idea is the bolts are not there merely to hold the cover on. They are there to do such things as hold the cover in place against the pressure of an arc blast, prevent the substantial spread of flame, or seal the interior against contaminants from the exterior.

2. **Boxes piled to the undersides of overhead busway.** While the boxes themselves present a fire hazard due to being combustible, they have been blocking airflow to the busway, if not insulating it thermally. If this is standard practice, it's only a matter of time until a bus gets bent or a lift truck connects with an energized conductor.

3. **Unused openings in enclosures still open.** Many times, it can seem to be perfectly safe because the enclosure is nowhere near an operator station or walkway. So nobody's gong to be sticking their fingers inside. What's the big deal? This is a basic Code compliance issue, for one thing [Sec. 110.12(A)]. And that enclosure wall isn't just a finger barrier. It would be a lot cheaper to make enclosures from shipping box cardboard than from steel, but it's steel (or a similar tough material, such as fiberglass) for a reason. The enclosure wall has several jobs to do, so having a space with no wall is a safety problem. It's also an equipment reliability problem.

4. **Gaps in raceway runs.** Raceway is commonly used as the equipment grounding (bonding) path [Sec. 250.118]. If that path is not mechanically continuous, where is the undesired current flowing and what differences of potential exist? And if the raceway was either assembled improperly or was damaged, what can we assume about the conductors inside it?

5. **PA system cabling draped over raceway.** This is a direct violation of Sec. 300.11(C). It's also a sign of poor workmanship and the shortcut mentality. Granted, this could have been done by a contractor not familiar with industrial settings. But the plant engineer or a similar person should have properly supervised the project and rejected this work rather than approve it. When you see this kind of thing in a plant, you have to wonder if anybody is in charge of protecting and maintaining the electrical infrastructure.

6. **Ground rods driven next to equipment.** This results from confusion over bonding and grounding. You do ground a separately derived source or a utility connection. You do not ground utilization equipment. Grounding the source is part of providing protection from lightning or other large transient voltages. Grounding on the load side of the source does nothing electrically, except connect the load side to the same place where you are trying to send the lightning or other large transients. The presence of grounding on the load side is a strong indication that the bonding is deficient, therefore there are likely dangerous differences of potential between metallic objects.

There are many other signs to spot — for example, food wrappers on the production floor, enclosure doors hanging open, floor fans blowing on switchgear, lift truck dents in transformer cases, or stuff piled in the walkway leading to an emergency exit door are additional signs that safety may not be top notch on this site. The more of these signs you see in a single facility, the more dangerous it is to be in there. Sometimes, a decision to not be there is called for.

There are also signs you don't spot right away. An electrical engineer employed by an electrical services firm was troubleshooting power quality problems at a medium-sized manufacturing plant when he discovered the raceway system (which was part of the equipment grounding system) was being used as the grounded, not grounding, conductor for the 277V lighting. This meant it carried the unbalanced current on it and presented a potentially lethal touch shock. He



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called his project manager, who instructed him to stop work at that plant.

Be alert for any signs that equipment is not installed or maintained according to its listing, NEC requirements, or basic electrical theory. When you spot such a sign, don't merely make a mental note of it. Take it as a danger sign, and act accordingly.

Mark Lamendola is an expert in maintenance management, having racked up an impressive track record during his time working in the field. He also has extensive knowledge of, and practical expertise with, the National Electrical Code (NEC). Through his consulting business, he provides articles and training materials on electrical topics, specializing in making difficult subjects easy to understand and focusing on the practical aspects of electrical work.

Prior to starting his own business, Mark served as the Technical Editor on EC&M *for six years, worked three years in nuclear maintenance, six years as a contract project engineer/project manager, three years as a systems engineer, and three years in plant maintenance management.*

Mark earned an AAS degree from Rock Valley College, a BSEET from Columbia Pacific University, and an MBA from Lake Erie College. He's also completed several related certifications over the years and even was formerly licensed as a Master Electrician. He is a Senior Member of the IEEE and past Chairman of the Kansas City Chapters of both the IEEE and the IEEE Computer Society. Mark also served as the program director for, a board member of, and webmaster of, the Midwest Chapter of the 7x24 Exchange. He has also held memberships with the following organizations: NETA, NFPA, International Association of Webmasters, and Institute of Certified Professional Managers.