

INTELLIGENCE UPDATE

Rising densities pose hidden risks for electricians



Rose Weinschenk 19 Mar 2026

As power density increases, data centers are expected to transition to higher voltages, which will demand new safety precautions. However, even before operators raise voltage levels, they are already pushing densities higher. The resulting safety risks may not be sufficiently appreciated because many electricians assume risks are inherently lower in a low-voltage environment.

High-density data centers using GPUs for workloads such as AI training are expected to move from today's 415 VDC and 480 VDC architectures to 800 VDC. Leaving aside the benefits — reduced current, less copper and lower thermal losses — future Nvidia products such as Rubin Ultra, which is set to launch in 2027, are expected to ship in 800V racks, driving a voltage increase across the facility.

However, not all data centers will make the change immediately. Most will support increased densities at existing voltages for an extended interim period. This results in higher currents and a greater risk of arc flash incidents, which may not be obvious to staff.

During this time, few organizations will update their training or safety culture despite the increased risks. Electricians may be asked to add circuits, replace aging ones, or work on equipment directly, including performing "hot work" on energized circuits, without fully appreciating the hazards associated with higher currents.

Changes create hidden danger

While some hyperscalers discuss switching to DC or bringing medium-voltage feeders deeper into the white space, most data centers will see rising rack densities long before high-voltage distribution becomes widespread.

In this interim stage, data center electricians who associate arc flash danger with voltage may develop a false sense of security. Arc flash severity is not determined by voltage alone but by worker distance, amperage and cycle time. All of these factors can change while the nominal voltage remains the same.

In modern data centers, higher-density racks can draw significantly more current without affecting the voltage. Workers who stray from procedure face the same risk of encountering an arc flash as before, but higher currents mean the resulting events will be hotter, larger and more powerful.

The situation is exacerbated by the growing use of selective coordination in switchgear. This design approach isolates faults as far downstream as possible. Upstream breakers are given a short-time delay to ensure downstream breakers trip first, preventing more widespread power loss. Because incident energy is directly proportional to time, arc flash energy can rise significantly during this delay.

Breaker safety may also be overlooked. Sites upgrading legacy equipment often replace circuitry rather than breakers, while maintenance tends to prioritize 480V systems with built-in protection mechanisms and features that require routine checks. Simpler 120V units may be tested on acceptance and then left untouched for decades.

A 120V arc flash will generally not sustain as long as one at 480V. However, higher fault current, older equipment, potentially unreliable breakers, and energy buildup from selective coordination can all increase arc flash severity.

Increased risks

Arc flash safety depends on basic precautions, including following safety procedures and using personal protective equipment (PPE). In the US, the Occupational Safety and Health Administration (OSHA) has reported a worrying number of arc flash injuries caused by failures in safety procedures, including unsafe work on energized circuits, missing low-voltage arc flash assessments, and inconsistent PPE use.

Arc flash incidents are believed to be rare in data centers. However, across all industrial sectors, there are around five per day in the US. Until recently, this figure had been falling steadily, but OSHA inspections show that progress has stalled. In response, the agency updated its arc flash guidance for the first time in 20 years in November 2024 (OSHA 4472-11 2024). The amended guidance recommends strict adherence to NFPA 70E, Standard for Electrical Safety in the Workplace, published by the National Fire Protection Association.

OSHA's legal authority may only apply to the US, but multinational companies and global auditors often treat its guidance as a benchmark, alongside technical standards from organizations such as the International Electrotechnical Commission (IEC).

Field observations

The real risk stems from worker complacency, warns Ron Davis, Uptime Institute's vice president of digital infrastructure operations. A fixation on voltage can mask the risk associated with higher

densities and encourage noncompliance with safety codes.

Uptime Intelligence has gathered statements from industry professionals through interviews and discussions on public social media forums, which show a concerning level of noncompliance. These insights can help owners and operators anticipate operational pitfalls during this transition period and plan more effective training.

The following anecdotes highlight industry-reported experiences with live electrical (hot) work:

- *"I'm looking for certifications or training courses for working on hot circuits. Given my industry, shutting down the feeder panels isn't feasible. My mentor — the senior tech guy at the site — does all of this like it's nothing; then again, he's been doing it his entire career."*
- *"Adding new circuits to your data center is usually possible without a shutdown, especially with low current usage. It's similar to adding breakers in a residential panel, but safety checks are crucial. Confirm with your lead technician if any temporary power interruptions are necessary."*
- *"I watched a guy change a 220V, 30A outlet in a data center while the line was hot. I nearly threw up, but he was the chilliest guy I've ever talked to."*
- *"Starting last year, one of our hospital's facilities departments refused to swap breakers in a hot panel in the data center; however, another says it's completely fine. I find the discrepancy between the two — especially since both cite 'code' rather than local policy — quite interesting."*

Company or site culture can determine whether hot work, or energized work, takes place. Even where hot work is discouraged, team leaders may lack clarity about which tasks are considered energized versus deenergized. These attitudes can soon become embedded in daily practice.

One example is "dead check" — the process of verifying that a circuit is completely deenergized. Electricians may mistakenly assume that switching off a breaker or opening a disconnect is sufficient to accomplish this task. However, an incident can still occur if the system contains stored energy, if components are not fully isolated, or if the lockout fails.

Even when the lockout is properly applied, the electrician performing the dead check may fail to tag out the equipment, allowing another worker to mistakenly reenergize it. Under lockout/tagout (LOTO) procedures, workers should still treat equipment as energized until testing confirms that it is not.

Another common misconception is that low-voltage hot work does not require permits. OSHA's updated guidance clarifies that all live work above 50V requires formal justification and permits. Some workers may deliberately skip permit-procurement steps to save time if they perceive the task as safe — often with encouragement from their managers.

Contractors are often expected to navigate permitting and safety requirements themselves, and some operators attempt to avoid potential liability by overlooking contractors' noncompliance.

There is typically limited oversight in this process unless an injury occurs.

The following observations highlight industry-reported experiences with safety and protective equipment, including PPE noncompliance:

- *"The majority of incidents I've heard of in the industry were caused by workers disregarding basic safety standards and PPE."*
- *"Some workers tend to overlook that checking a circuit is dead or racking a deranged breaker is still considered hot work and require appropriate PPE."*
- *"Some small colos don't provide PPE, making it optional for the worker (based on my first-hand experience at a relatively small facility). Until a major incident is reported, that company won't implement a formal PPE requirement."*
- *"Health and safety wants me to wear high-vis gear when I'm not switching, but take it off when I am. Since I'm switching all the time, it's impractical to constantly take on and off the gear throughout the day."*
- *"Some job sites specify requirements but rarely enforce them. The data center I'm at specifies full-leather footwear, but guys wear hiking-style boots and nobody says a thing."*

Workers' confusion extends to the role of PPE in low-voltage regimes. PPE is a last line of defense against hazards, secondary to proper procedure. However, workers sometimes substitute PPE for proper LOTO procedures and proceed to work on live low-voltage equipment.

Conversely, some workers may forgo PPE during a dead check once LOTO has been completed. OSHA guidance now clarifies that arc flash PPE is required during all energized work and whenever staff are within established arc flash boundaries. PPE must be arc-rated and match the incident energy level at the specific work location. In practice, however, different sites do not always enforce PPE consistently.

Comfort and site culture both drive PPE noncompliance. Arc-rated PPE can be cumbersome and heavy, which impedes movement. As such, experienced electricians who have worked without PPE in the past may see it as an unnecessary burden. In some cases, PPE use is incorrectly associated with inexperience, while noncompliance is viewed as a marker of advanced skill.

Strategies for owners and operators

Data center operators are grappling with workforce shortages and rapid industry growth. Under these conditions, strained staff may overlook compliance when trying to meet deadlines. While arc flash is a known hazard, misalignment between perceived and actual risk — particularly in dense electrical environments — is an emerging issue.

Misinformation regarding correct terminology and procedures further compounds this risk. Owners and operators should consider the following strategies to address worker behavior and improve safety:

- **Collaborative PPE selection.** Collaborating with employees to test various types of PPE for comfort and usability can help workers feel a sense of ownership and improve compliance, compared with a top-down approach dictated by management.
- **Clarify terminology.** Allocate time to review commonly misunderstood terms such as "energized." Use the updated OSHA guidance as a reference.
- **Provide context.** Experienced electricians may view procedural changes as unnecessary after years of working without incident. To convince staff the importance of these changes, communicate the findings that prompted the new standards. Transparency improves trust and facilitates compliance.

The Uptime Intelligence View

Data center electricians are entering a period in which evolving infrastructure may introduce hidden risks to everyday operations. The industry needs to overhaul its procedures and address gaps in compliance or risk sending workers into environments for which they are inadequately prepared.

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