

# Unlocking the hidden value of arc-flash mitigation



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Two months later, a large data center in Atlanta made headlines when its operator filed a lawsuit against contractors in connection with a 2011 arc flash that caused a power

outage and did \$5 million damage, according to the Atlanta Business Chronicle

Details behind such failure are often complex, but the headlines alone are instructive for a few reasons:

1. Arc flash is more common and more dangerous than many people realize – occurring about 4,000 times a year, according to the U.S. Department of Labor, with 75 percent resulting in significant disabilities or death.
2. Even modest data centers today may be powered by utility-grade electrical systems – the inherent hazards of which cannot be treated like an ordinary office environment.
3. In an industry where outages and downtime can cost thousands of dollars a minute, damage from an uncontained arc flash can quickly spread, affecting operations and profitability for weeks or months.

"Data centers typically have redundant operating systems to limit downtime," says Frank Burgess, Business Development Manager and Field Application Engineer at ABB. "In any of these, switchgear is central to managing electrical flow among them. That means it's going to be very difficult to contain an arc flash incident that involves conventional switchgear. You are going to have downtime or disruption; you're going to lose electrical capacity; you may have serious injuries; it's going to be costly."

That's why arc-resistant switchgear is finding its way into more and more data centers; it reduces those risks.

The technology isn't new or exotic, according to Burgess; it is effective and has been well-tested in a wide range of industries and environments.

It works through such design elements as closed door racking, plenum chambers and blast resistant doors, as well as modular components that are removed and depowered before being opened for servicing. These designs are all part of the ANSI C37.20.7 standard that governs arc-resistant switchgear, and are only a few examples of the differences that make arc-resistant switchgear safer and more reliable.

In the event of an arc flash, these protective features are designed and tested to contain the blast and divert its energy away from people and other nearby assets. As a result, damage in medium-voltage equipment may be limited to a single lineup, or even one frame, depending on the type of arc-resistant design that is specified.

Of course, this technology comes at a price: Arc-resistant medium-voltage switchgear costs 10-15 percent more than conventional switchgear.

Because of the way equipment is typically specified in a capital project – based on its installation cost, as opposed to total cost of ownership – the value of arc-resistant switchgear is often underestimated, Burgess notes.

Here, according to Burgess, are three other aspects of arc-flash mitigation that are often overlooked or misunderstood:

**1. Two layers of protection:** To mitigate arc flash risk, non arc-resistant switchgear can be paired with an active fault-protection system that monitors and shuts down equipment at the first sign of high intensity light and/or a dangerous spike in current. This is a good first step in protection of personnel and equipment. These systems add minimum complexity and cost to an electrical project, and they can be retrofitted to existing equipment. But they represent only one level of protection. A comprehensive design that minimizes risk of injury and damage will contain both active and passive measures. The active fault-protection system minimizes the duration of a potential fault, while the passive features of arc-resistant switchgear contain the fault – a combination that provides the ultimate in protection for people and operations.

**2. Faster, safer maintenance:** Arc-resistant switchgear with features such as closed-door racking or touch-safe design allows workers to safely withdraw energized components to a disconnected state, and work on designated areas of

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equipment, such as low-voltage compartments that have been isolated from risk areas. All these functions can be performed with a reduced HRC (Hazard Risk Category), based on the results of an arc-flash hazard analysis with this equipment in place – allowing maintenance to be conducted faster and more safely with less disruption to operations.

**3. Reduced incident cost and recovery time:** If a single arc flash incident is averted or minimized over the equipment's lifetime, arc-resistant switchgear and an active mitigation system will more than pay for itself by reducing or eliminating:

- Significant fines for non-compliance to OSHA regulations
- Cost associated with potential personal litigation and hospital treatment
- Damage to other equipment;
- Loss of business due to long replacement lead times;
- Customer charges for failing to meet service level agreements;
- Lost employee time;
- Negative impact on company reputation and credibility;
- And most important, injury or loss of life.

For these reasons, some insurance underwriters even offer financial incentives that make the use of arc-resistant switchgear more attractive.

"When you combine all of these factors, comprehensive arc-flash mitigation is one of the better business decisions you can make in the data center," Burgess says. "If it keeps you out of the headlines, it's delivering value."

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