



EXECUTIVE SUMMARY

Overvoltage Protection: Key Changes in the 2023 NEC Around Surge Protective Devices (SPDs)

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Kimberly Fairley, Product Marketing Manager, Surge Protective Devices and
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OCTOBER 25, 2023

KEY TAKEAWAYS

- Surge protective devices reduce electrical equipment failure.
- Surge protection helps improve ROI.
- Key updates in the NEC require SPD installation for new or replacement equipment.
- ABB solutions provide the surge protection needed to protect investment.

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OVERVIEW

Advancements in technology and the investment in increasingly sensitive and critical pieces of electronic equipment are making surge protection ever more critical. Surge protective devices (SPDs) are designed to reduce transient voltages present on premises in power distribution wiring and load-side equipment, helping to extend the useful life of equipment, reduce operational downtime, and more. The 2023 National Electrical Code (NEC) recognizes this critical component in today's electrical systems with several key updates.

ABB offers a complete portfolio of SPDs for residential and commercial applications. The latest ABB SPDs meet the most recent NEC requirements for new and replacement electrical equipment, helping protect investments and keep people and property safe from potential damage caused by surges.

CONTEXT

Brian House explained the importance of SPDs and outlined key SPD-related changes to the NEC. Kimberly Fairley discussed ABB's SPD portfolio.

KEY TAKEAWAYS

Surge protective devices reduce electrical equipment failure.

According to the [NEMA Surge Protection Institute](#), electrical surges are the leading cause of failures in electrical equipment in the U.S., costing the economy \$5 to \$6 billion annually—a 40% increase over 2007. A typical building experiences up to 150 surges per month. Without surge protection, a surge can result in permanent damage to equipment and/or cumulative degradation, leading to eventual failure.

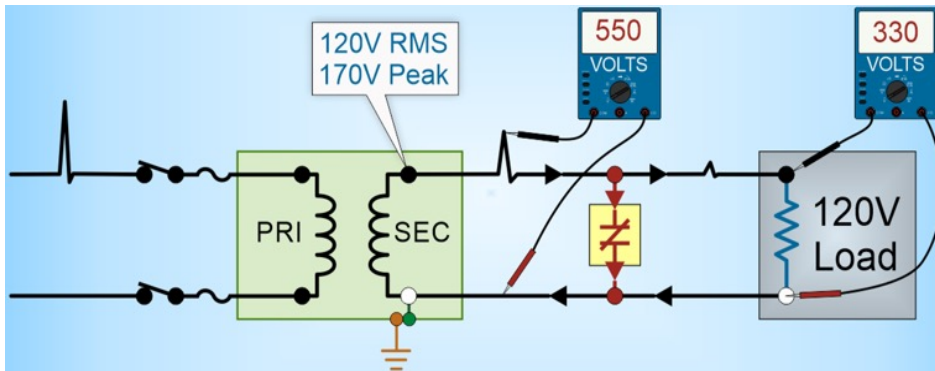
“There’s so much equipment that is installed that is potentially impacted by a transient surge in a negative way, and their failure could in some way either jeopardize the property they’re protecting or the people they’re protecting.”

Brian House, Mike Holt Enterprises

An SPD reduces the amount of transient voltage that can reach a piece of equipment in a surge event. When a surge occurs, the SPD activates, reducing the amount of surge that enters the building to a level that equipment is more likely to tolerate and that is less likely to cause degradation over time.

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Figure 1: SPDs use MOVs to reduce voltage



Surge protection helps improve ROI.

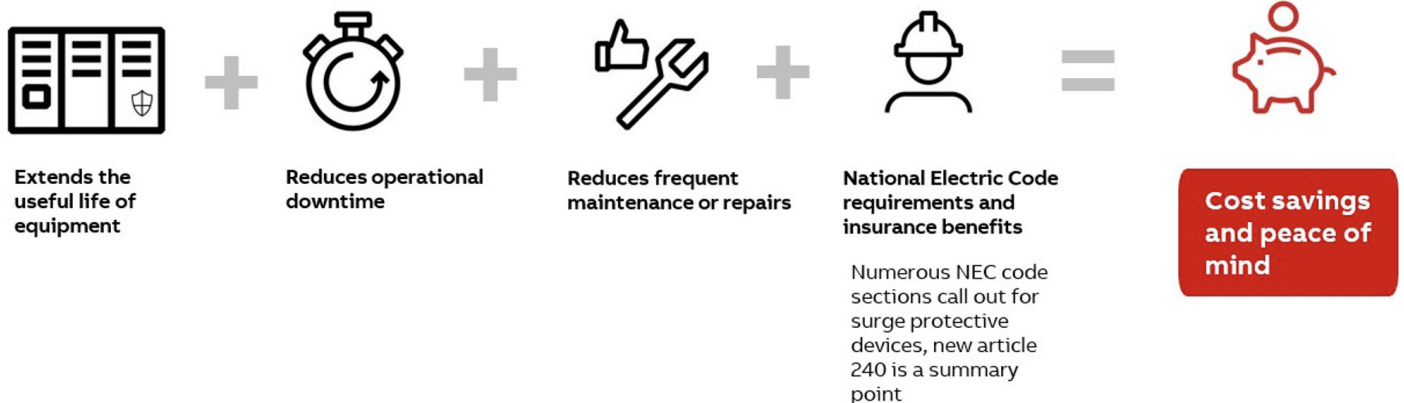
As the use of electrical devices has grown, consumers looking to protect their investment in electrical equipment have driven continuous improvements to SPDs. As a result, the NEC was developed to provide guidelines for proper electrical installation, maintenance, and safety.

NEC Article 90 explains the purpose of the NEC, which is to protect persons and property from hazards and damage caused by electrical events. Although NEC Article 90 is not a performance document, protection does impact the performance and longevity of equipment, which in turn impacts ROI.

“[ROI] depends on how well does the equipment function? And how long does the equipment last? Part of that function and that longevity has to do with whether or not the equipment gets damaged from surge, so installing some quality, properly sized surge protection is one great way to ensure that you get ROI and longevity out of your equipment.”

Brian House, Mike Holt Enterprises

Figure 2: Surge protection provides cost savings and peace of mind



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Key updates in the NEC require SPD installation for new or replacement equipment.

As new equipment is developed or new scenarios observed, the NEC is updated by a code panel during regular code cycles. It is the responsibility of overseers or installers of a project to ensure awareness and compliance with new and updated codes. Some of SPD-related updates to be aware of include:

NEC Article 215.18

Article 215.18 requires that SPDs are installed for new or replaced distribution equipment where a feeder supplies dwelling units, dormitory units, guest rooms and suites, and patient sleeping areas of nursing home/limited care facilities. The SPD must be installed in or adjacent to the distribution equipment which contains the branch-circuit overcurrent protective device(s) and must have a nominal discharge current rating of not less than 10kA.

The SPD is required to be either Type 1 or Type 2. Type 1 is designed to be used ahead of the primary overcurrent protective device and has built-in safety features so that protection specifically for the device is not required. Type 2 is designed to be used after the primary overcurrent protective device.

NEC Article 225.42

Article 225.42 requires the same SPD installation in an exterior system.

NEC Article 230.67

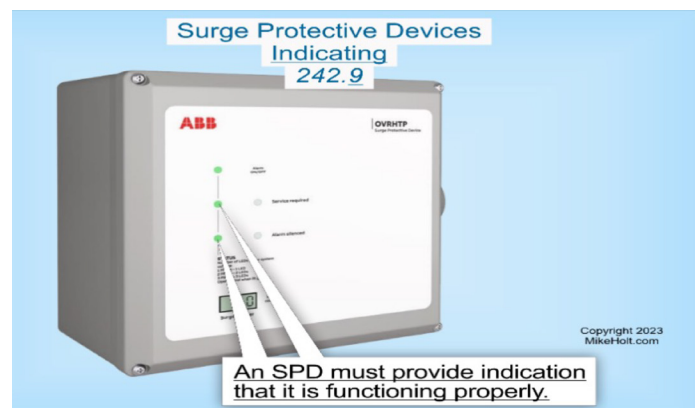
- **230.67(A)** now requires surge protection for dwelling units, dormitory units, guest rooms and guest suites of hotels and motels, and areas of nursing homes and limited care facilities used exclusively as patient sleeping rooms—regardless of the size of the structure or number of rooms.
- **230.67(B)** requires that, where a service supplies a dwelling unit, an SPD must be provided in or adjacent to the service equipment. (Exception: the SPD is permitted to be at the downstream panelboard. Multiple downstream panelboards require multiple surge protective devices.)
- **230.67(D)** says that where service equipment is replaced, surge protection must be installed.
- **230.67(E)** requires that SPDs have a nominal discharge current rating of not less than 10kA.

ABB advises the best practice of keeping the length of conductors to the SPD as short as possible. Longer conductors significantly reduce the effectiveness of the SPD.

NEC Article 242

Article 242 provides the general installation and connection requirements for overvoltage protection and overvoltage protective devices.

Figure 3: 242.9 requires that an SPD provide indication that the equipment is functioning correctly



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NEC Article 242.13(B)

Article 242.139(B) requires that where Type 1 SPDs are installed at the service, they must be connected to the service neutral conductor, the grounding electrode conductor, the grounding electrode for the service, or the equipment grounding terminal in the service equipment.

Other Article Updates

- Article 242.14(A) allows only one conductor to be connected to a terminal unless the terminal is identified for multiple conductors.
- Article 695.15 requires an SPD for fire pumps.
- Article 700.8 added a requirement for SPD use when switchgear is used in emergency systems.
- Article 760.33 requires an SPD for fire alarm control panels.

“We have to stop thinking of SPDs as a nice-to-have. They really are a necessity.”

Kimberly Fairley, ABB

ABB solutions provide the surge protection needed to protect investment.

The need for SPDs will only continue to grow over time to meet the growing demand for power from an increase in electrical equipment for business and consumer applications. ABB offers a full range of SPD solutions that protect investment in equipment and meet changing NEC standards for surge protection. From SPDs for critical power applications, to SPDs for data and signal protection, ABB has it covered.

New ABB devices such as the THQLSURGE2, THOMESURGE, and OVRHT3D provide NEC-compliant solutions for residential applications. ABB’s family of Current Technology SPDs are Type 1 SPDs designed for NEC-compliant commercial use, with a modular design and advanced, connected monitoring capabilities that support vital operations in healthcare, airports, wastewater treatment plants, and more.

ADDITIONAL INFORMATION

To learn more about ABB, visit global.abb/group/en

Figure 4: ABB Surge Protective Devices



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BIOGRAPHIES



Brian House

Vice President/Digital & Technical Training, Mike Holt Enterprises

Brian is a high-energy entrepreneur with a passion for doing business the right way. He's a licensed electrical contractor and worked in varying aspects of electrical contracting throughout the southeast United States since the 1990s. From single-family homes to industrial manufacturing, he's enjoyed everything from service work to designing energy-efficient lighting retrofits, exploring "green" biomass generators, and partnering with residential PV companies. Since 2000 Brian has enjoyed teaching at seminars and apprenticeship classes.

In 2010 he joined the Mike Holt video teams, and in 2014 joined the Mike Holt Enterprises staff as the technical director. He is still actively involved in developing in-house electrical apprenticeship programs and continues to teach nationally for Mike Holt Enterprises on a variety of topics including Code Changes, Grounding vs. Bonding, Exam Preparation and How to Be a Great Instructor. Brian and his wife Carissa have shared the joy of their four children and many foster children during their 18 years of marriage.

When not mentoring youth at work or church, he can be found racing mountain bikes with his kids or fly fishing on Florida's Intracoastal Waterway. Passionate about helping others, he regularly engages with the youth of the local community to motivate them to explore their future.



Kimberly Fairley

Product Marketing Manager, Surge Protective Devices and SMISLINE TP Busbar Systems, ABB

Kim is the U.S. Product Marketing Manager for ABB Surge Protective Devices and SMISLINE TP Busbar Systems at ABB Electrification - Smart Buildings Division, a global leader in electrical products and solutions operating in over 100 countries.

With over 15 years of experience in product development, product management, and marketing from multiple industries, Kim is responsible for the overall product strategy, positioning, and commercialization of SPDs and SMISLINE TP for the U.S.

She received her MBA from the University of Wisconsin-Parkside and her B.S. in Textiles from North Carolina State University.