



Power Surges in Commercial Facilities

Power or voltage surges are brief bursts of energy caused by a sudden change in the electrical conditions of a circuit; they are virtually inevitable. Wherever electrical or electronic equipment is used, power surges can and do occur. While often lasting only millisecond, power surges can raise the voltage in electronic circuits from a few hundred to as much as several thousand volts.

They are one of the most severe, common and immediate dangers to modern, sensitive electronic equipment. In fact, *Business Week* estimates that power surges cost businesses \$26 billion annually in lost time, equipment repair and replacement costs.

What Causes Power Surges

It is estimated that 60% to 80% of power surges are caused by events or problems arising within the facility housing the electrical and electronic equipment. The balance of surges is generated by external events that affect the internal electrical system through power cords, telephone lines and cable, satellite and antenna lines.


Events causing surges include:

- **Local Power System Problems:** Poor power quality is one of the major causes of downtime. The most common source of externally generated surges is the local electric company. Problems and points of failure include faulty wiring by a utility, equipment breakdowns, downed power lines, grid shifting (reallocating stored energy to match demand), and capacitor switching (a routine, daily event).

Large users of the same power line at other facilities can also create power surges. Heavy electrical equipment that frequently turns on and off, such as high-powered motors, elevators, or heating/air conditioning equipment, creates sudden, brief demands for power that can upset the steady voltage flow in the electrical system and result in power surges affecting everyone connected to the same power line. Externally generated surges may also be caused when two power lines come into contact with each other as a result of vehicle crashes damaging power poles, fallen tree limbs, ice storms or animals.

- **Lightning:** Power surges caused by direct lightning strikes are rare events, accounting for only 2% of power surge damage. Lightning, however, is a very common occurrence, striking the surface of the Earth about 100 times every second. When lightning directly strikes exposed cables feeding electric equipment, the extremely large, overwhelming power surges it produces are devastating. Importantly, lightning does not need to actually directly hit an object on the ground to induce a power surge.

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Lightning can create strong electromagnetic fields, which can induce a power surge that affects power, telecommunications and radio frequency transmission lines; these in turn affect electric equipment inside a facility. Due to the low voltages normally used in data transmission cables and the sensitivity of the connected electronics, communications cables are extremely susceptible to induced voltage surges.

- **Events Arising Within the Facility:** Switching high-powered electrical devices like elevators, air conditioners, refrigerators, pumps, compressors and motors on and off are common causes of internally generated surges. Also, the ignition and interruption of electrical arcs used in welding devices can cause surges, as can the tripping of fuses and circuit breakers. Typically, but not always, these surges are rather small and degrade electrical equipment, rather than destroy it.

What Types of Businesses and Equipment are at Risk?

Virtually every business relies on modern electronic equipment to some degree – and such equipment can be easily damaged or weakened by surges. Businesses face significant threats if their products or services rely on sustaining continuing operations supported by electronic or telecommunications equipment, or if malfunctions of sensitive electronic equipment change the nature of critical products and/or services.

Businesses with electronic systems in hazardous locations, such as potentially explosive atmospheres, obviously are exposed to catastrophic risks. Businesses located in areas with poor local power supplies or where weather conditions make lightning strikes more likely also face increased risk of damage from power surges.

Examples of businesses and equipment at risk include:

- Manufacturing operations where there is significant use of motors and other high voltage equipment;
- Businesses that depend on computers, and use office equipment such as printers, faxes and photocopiers;
- Businesses that use security or alarm systems, telemetry or monitoring networks, bar code scanners or thermostats;
- Healthcare facilities with equipment monitoring and assisting life support systems; and,
- Information and order processing operations with heavy reliance on communications.

Source: *Institute for Business & Home Safety (IBHS)* – www.disastersafety.org

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