# Why NEC 392.20(C) leaves you unprotected

## *Short Circuit Events and the Havoc They Wreak on Infrastructure Projects*

There are many ways for a short circuit fault to develop, and they can happen anywhere along the electrical distribution system. Short circuit faults occur when an abnormal connection between two nodes of an electric circuit is made.

During a short circuit fault, maximum electromechanical stress between conductors occurs at or before 0.005 second. Current levels in these events can range upwards of 200 kA. In the worst case of a 3-phase short, magnetic field induced repulsive forces between the cables can range upwards of 10,000 pounds.

When a short circuit fault occurs, tremendous magnetic forces repel the power cables from each other resulting in violent forces that damage everything in their path. Typical circuit breakers and other protection devices trip and interrupt a fault between 0.06 to 0.1 second, leaving just enough time for substantial damage to occur.

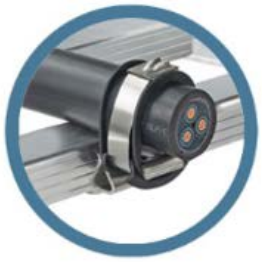
Cable cleats reduce damage and rework by performing their function within those first 0.005 second (i.e. at peak kA) before a circuit breaker trips and interrupts a fault, making them the best option for short circuit mitigation.

Without the use of a cable cleat system, there is no protection for the employees or equipment in a facility when the short circuit forces are at their peak prior to a circuit interrupter engaging. To avoid potentially severe damage to the facility and infrastructure, as well as personal injury, cable cleats are used to restraint cables during short circuit events.


Cable tray systems provide more design flexibility and can be easier to install than traditional pipe and wire but must be properly engineered for protection against short circuit faults. Cable tray applications are only a safe and viable solution when paired with the right cable cleat.

Specifying and installing the right cable cleats when electrical infrastructure is first established is paramount to setting projects up for success. While metal conduit is often

used in several areas of a project to distribute power, it is also often distributed by cables in a cable tray system.



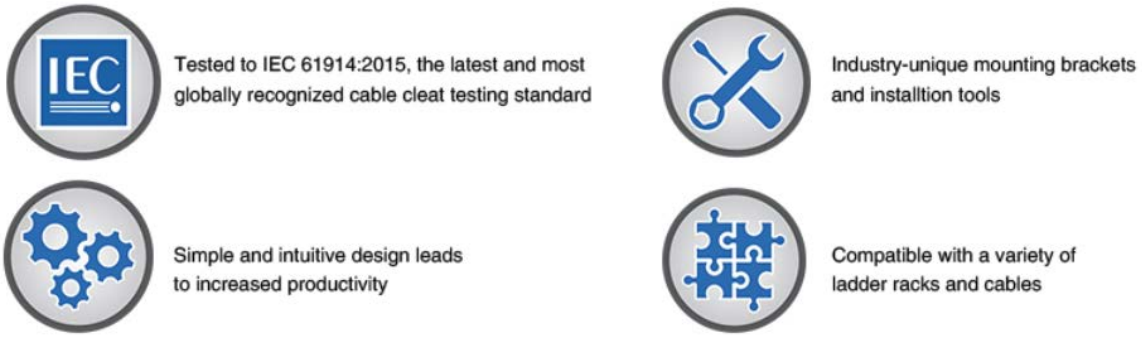
In the U.S., NEC 392.20(C) is the National Electrical Code that governs the safety of the cable installations in cable tray. NEC Article 392.20(C) states: “Parallel connected single conductor cables shall be securely bound in circuit groups to prevent excessive movement due to fault current magnetic forces.”

While NEC 392.20(C) includes language for securing cables during a short circuit fault, is does not specify how to design the proper containment system to meet those forces. Often the lack of clear guidelines on short circuit protection in the NEC results in inadequate or no cable containment to protect against short circuit events in tray cable installations. Europe has been utilizing cable tray systems for several decades and leads the industry in design standards and best practices.

As such, the IEC 61914:2015 standard provides the testing methodology and process to ensure reliability of cable cleats and ultimate protection in the event of a short circuit event. Cable in cable trays are only a safe and viable solution when paired with the right cable cleat solution to protect against short circuit events.

Unfortunately, NEC 392.20(C) does not currently provide specific guidance on how to securely contain cables in the event of a short circuit when routing cables in a cable tray. To protect the electrical infrastructure when using power cables in a tray, installing an IEC 61914:2015 compliant cable cleat is the best option when protecting against a peak short circuit fault.

**To learn more about Panduit Cable Cleats, visit [www.panduit.com/cablecleat](www.panduit.com/cablecleat)**



# Panduit's Cleat KAlculator™ App

Selecting the right Cable Cleat has never been so easy! The new Cleat kAlculator™ app streamlines the selection process to quickly determine the right cable cleat without the lengthy engineering consultation with 3 simple steps.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