

Applying Lighting Control Systems That Meet New Electrical Installation Code

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INTRODUCTION

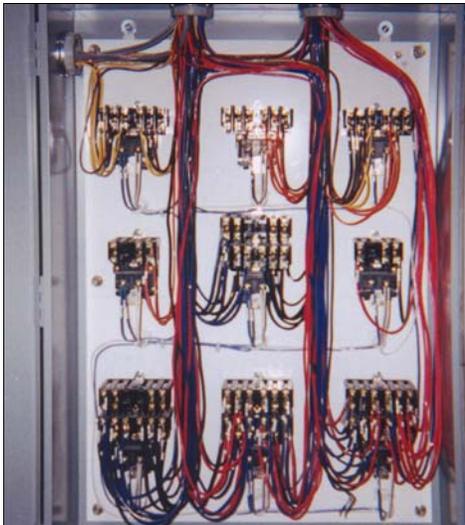
The recent adoption of many state building energy codes is establishing the demand for complex lighting control systems. Ensuring appropriate ratings when applying this equipment is necessary for NEC compliance. This practice extends to both the lighting system and the controls which operate the system. Control systems are available that will provide many years of reliable service provided that the proper equipment and application are selected and installed.

A major change appeared in the 2005 edition of the National Electrical Code (NEC) that will directly re-enforce the way lighting control systems are selected and applied. Included within the 2005 NEC is a new Article 409 on Industrial Control Panels. This article provides the installer and Authority Having Jurisdiction (AHJ) with the minimum requirements to facilitate the proper installation and inspection of industrial control panels. It became effective January 1, 2005 for those jurisdictions that adopted the new edition of the code.

A major aspect of Article 409 states that all panels that meet the definition of an industrial control panel must be listed and labeled with a short circuit current rating (SCCR). The SCCR must be established using an approved method. This SCCR establishes the maximum level of short circuit current that may be imposed on the panel.

WHAT EXACTLY IS AN INDUSTRIAL CONTROL PANEL?

Figure 1: Typical Lighting Control Panel



The title of Article 409, 'Industrial Control Panels', is somewhat unclear to many readers. They tend to think this article applies only to panels used in industrial facilities for process or related control. A careful review of the definition found in 409.2 shows its relevance to all types of control panels including those used to control lighting loads, whether used in industrial facilities, commercial buildings, or residential homes.

Article 409.2 defines an industrial control panel as:

"an assembly of a systematic and standard arrangement of two or more components such as motor controllers, overload relays, fused disconnect switches, and circuit breakers and related control devices such as pushbutton stations, selector switches, timers, switches, control relays, and the like with associated wiring, terminal blocks, pilot lights, and similar components. The industrial control panel does not include the control equipment."



For lighting control applications, the definition applies to any enclosure containing two or more components. Such panels would include those containing two or more contactors, a plurality of lighting relays such as are found in many manufacturers lighting control cabinets, panels containing dimmer circuits and overcurrent devices, and cabinets containing time clocks with power switching relays.

WHAT IS A SHORT CIRCUIT CURRENT RATING (SCCR)?

The short circuit current rating (SCCR) of the equipment is the maximum level of available short circuit current on which the marked equipment can be applied. A short circuit current rating is not the same as an interrupting rating. Interrupting ratings are applied to overcurrent protective devices like circuit breakers and fuses. The interrupting rating is the maximum short circuit current that the overcurrent device can interrupt.

Article 409 requires the short circuit current rating of the industrial control panel be based on one of the following:

- a. short circuit current rating of a listed and labeled assembly
- b. short circuit current rating established utilizing an approved method

The NEC provides guidance with a FPN which indicates UL 508A is an example of a method to determine the SCCR of the panel. The AHJ often recognizes similar UL Standards but it should be noted that many of these standards only contain provisions for establishing short circuit current ratings to a maximum value of 1000A (see Table 1). For most commercial, institutional, and industrial facilities a far greater SCCR will often be required depending on where the equipment is located in the electrical system.

Table 1: UL Standards for 1000 A SCCR

UL Standards with provisions for a maximum 1000 A SCCR	
UL20	General-Use Duty Snap Switches
UL244-A	Solid-State Controls for Appliances
UL916	Energy Management Equipment
UL1472	Solid State Dimming Control
UL Standards with provisions for exceeding a 1000 A SCCR	
UL508A	Industrial Control Equipment
UL67	Panelboards

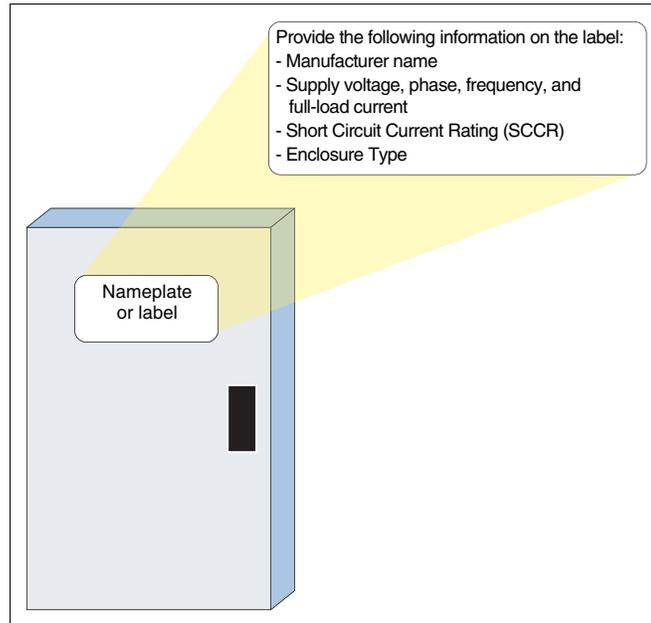
Article 409 also requires that the SCCR of the panel be marked and plainly visible after installation. Marked SCCR's are important, because not only are they required to ensure compliance with the NEC 110.10, but they help simplify the inspection and approval process.

Section 409.110 identifies specific information that must be plainly visible after installation. See Figure 2 on page 3.

NEC 110.10 — Circuit Impedance and Other Characteristics.

The overcurrent protective devices, the total impedance, the component short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit-protective devices used to clear a fault to do so without extensive damage to the electrical components of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the grounding conductor or enclosing metal raceway. Listed products applied in accordance with their listing shall be considered to meet the requirements of this section.

Figure 2: Typical SCCR Label information

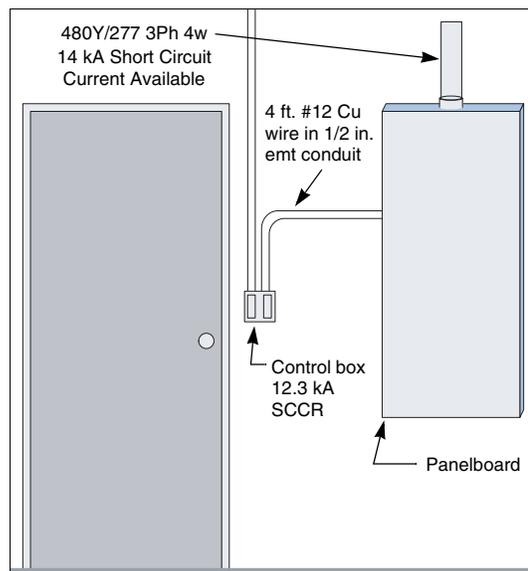


In cases of simple assemblies consisting of control components installed in an enclosure, the AHJ may not consider these assemblies to be industrial control panels. In such cases a SCCR marking may not be required. However, the enclosure and components must still comply with NEC 110.10.

It is the responsibility of the installer to ensure that individual components, such as switches, have adequate SCCR for the available short circuit current. For each assembly that the AHJ must approve, it is necessary to be keenly aware of the available short circuit current at the point where the assembly is installed and be able to show the AHJ that the components are rated for application.

NOTE: Even in applications where the AHJ may not consider the equipment to be an industrial control panel, the installer must ensure the equipment selected has an adequate SCCR per NEC Article 110-10. The application illustrated in Figure 3 shows the short circuit available current at the panelboard as 14 kA.

Figure 3: Typical Panel Application



HOW THIS ARTICLE WILL AFFECT YOU

In the past, proper application of lighting controls was based on general requirements from several different articles in the NEC. Sometimes this resulted in misinterpretation and misapplication of the NEC. Article 409 provides installers and inspectors with clear and concise information regarding such panels.

By following the requirement of NEC409, the AHJ will be able to clearly determine if equipment or components are suitable for the application. This will make your job run more smoothly without interruptions. Following the suggestions below will help ensure that you follow the requirements.

1. When ordering lighting control equipment, specify listed and labeled panels – even though you may not have made this specification in the past.
2. When ordering lighting control equipment, make sure you know the available short circuit current at the point in the system where the control will be installed and specify an adequate SCCR for the control equipment.
3. Be prepared to reject any equipment that does not contain markings that clearly show the panels SCCR after installation. Make sure all equipment is clearly marked prior to inspection.

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