The North American Electrical Safety System

Changes affecting Industrial Control Panels

A White Paper on UL 508A, NEC 409 and related codes and standards changes that affect panel builders, machine builders and those who design and develop industrial control panels.

Merlin Gerin
Square D
Telemecanique

Schneider Electric

What is the North American Electrical Safety System?

Participants in the electrical industry have always had one common goal – the safe use and installation of electrical products and systems. The North American Electrical Safety System is comprised of three major components that are closely aligned to ensure safe products and safe installations as shown below.

The installation code sets the minimum installation rules for electrical products and systems. The product standards set the design, construction and safety related performance requirements for electrical products to ensure compliance with the installation code. Most installed electrical distribution and control equipment is listed under a third party certification program. Inspection authorities rely on third party certification to ensure that products meet the standards and the installation code. All the above components combined form an effective electrical safety system.

What's New – Installation Code?

The 2005 edition of the National Electrical Code® (NEC®), NFPA 70 was published in September 2004, and became effective January 1, 2005, for those jurisdictions that immediately adopt the new edition of the code. The latest version includes a new Article 409 entitled "Industrial Control Panels." This article now provides equipment installers and enforcement authorities with the minimum requirements to facilitate the safe installation and inspection of industrial control panels.

Why Article 409?

Up until now, industrial control panels have been installed in accordance with general requirements from several different sections of the code. With the increase in the use of these products, there has been a significant increase in the misapplication of control panels and the related equipment associated with their installation. NEC Article 409 provides a dedicated list of requirements for the installer and electrical inspector to utilize to ensure safety is not compromised, resulting in safer installations.

Article 409 – What do I need to know?

The new Article 409 covers industrial control panels that are intended for general use and that operate at a voltage of 600 Vac or less. In addition, this Article recognizes in Table 409.3 that industrial control panels may be constructed and installed for use in applications covered by other Articles in the NEC, such as Article 440 for air-conditioning and refrigerating equipment, Article 610 for cranes and hoists and Article 670 for industrial machinery.The major feature of the new Article 409 is the requirement that an industrial control panel has to be marked with a short circuit current rating (SCCR).

UL 508A, The Standard for Safety for Industrial Control Panels is referenced overall in the Article for evaluating control panels and its Supplement SB is noted as being an approved method for establishing the short circuit current rating of the panel.

How can a manufacturer obtain the needed SCCR for a given panel?

The manufacturer has three options:

1) Test each panel construction and record the construction in their Follow-up Procedure. With the multitude of possible combinations, this option would require considerable testing and maintenance on the control panel manufacturer's file;

2) Purchase previously tested constructions from a major supplier of equipment that can be tabulated in the control panel manufacturer's procedure;

3) Apply the method described in UL 508A Supplement SB.

Product Standards – What is UL 508A Supplement SB?

The SB outlines one of the methods that can be used to determine the SCCRs of an industrial control panel. There are three distinct steps to establishing the rating:

1) Establish the short circuit current rating of individual power circuit components (SB4.2).

2) Modify the available short circuit current within a portion of a circuit in the panel based on current limiting devices that may be present in the feeder circuit (SB4.3).

3) Determine the overall short circuit current rating of the panel (SB4.4).

Each one of these steps is further detailed in its respective section of the SB.

Summary

As mentioned before, the effective date for SCCR marking was January 1, 2005 for those jurisdictions that immediately adopt the 2005 NEC. Inspectors and facilities engineers in these jurisdictions will begin rejecting control panels that are not compliant with these new requirements.

Previous editions of the NEC provided no guidance to the electrical inspector that would ensure electrical safety for control panels. Some states introduced their own specific rules to address the safe installation of panels. Article 409 now provides the minimum requirements to facilitate the safe installation and inspection of industrial control panels.

Local Implementation

State jurisdictions have adopted Code change at various times as illustrated by the chart below. This information is provided simply as a possible indicator of each state's willingness to adopt new Code changes.

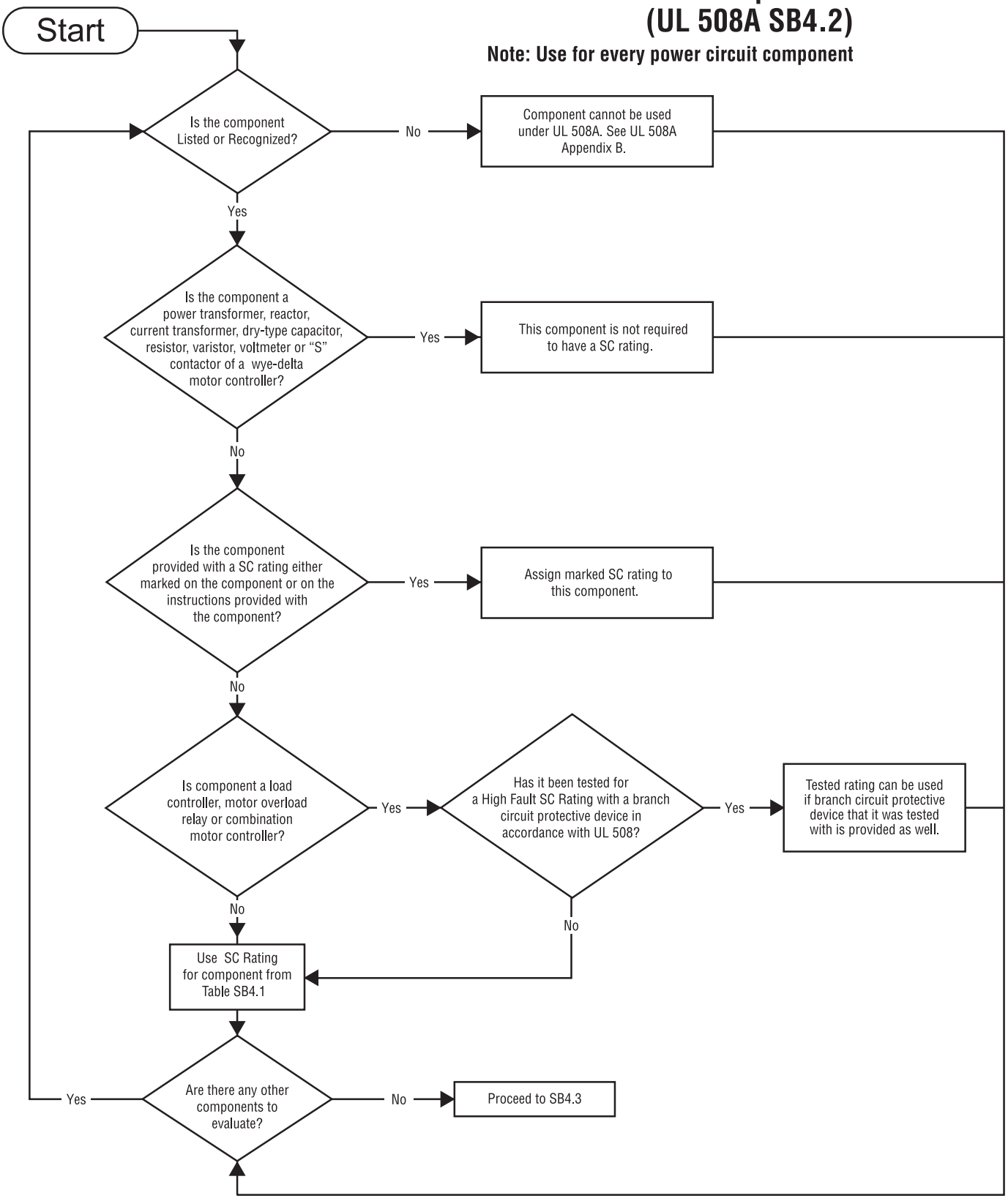
List of Current Code Version by State/Jurisdictions

Source National Fire Protection Association, One Stop Data Shop, Fire Analysis and Research Division, Quincy, MA 02169-7471

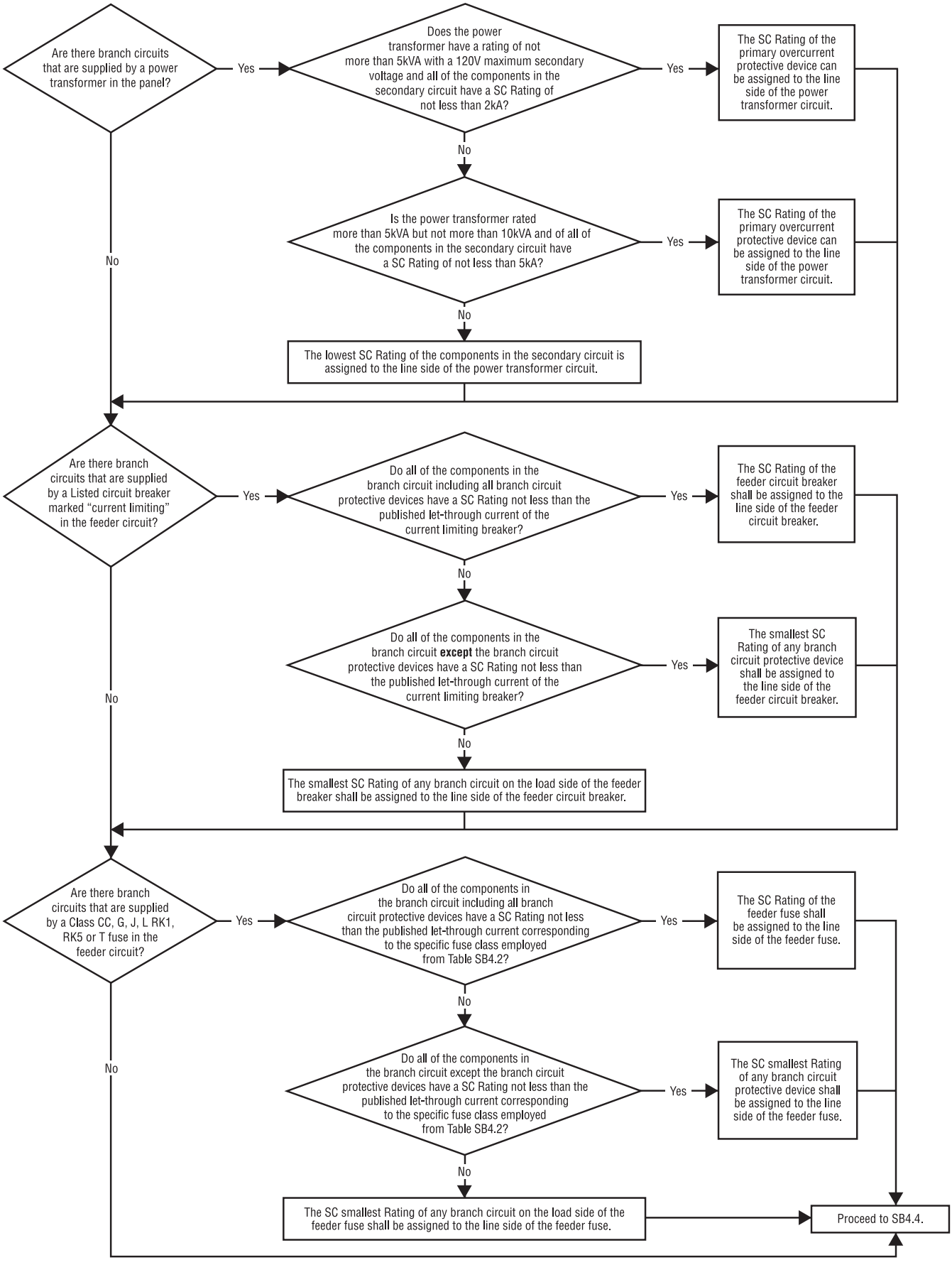
To obtain current State level Code adoption information, please visit www.us.squared.com/ul508a and select the link "Interactive NEC Code adoption map"

Establish SCCR of Individual Power Circuit Components (UL 508A SB4.2)

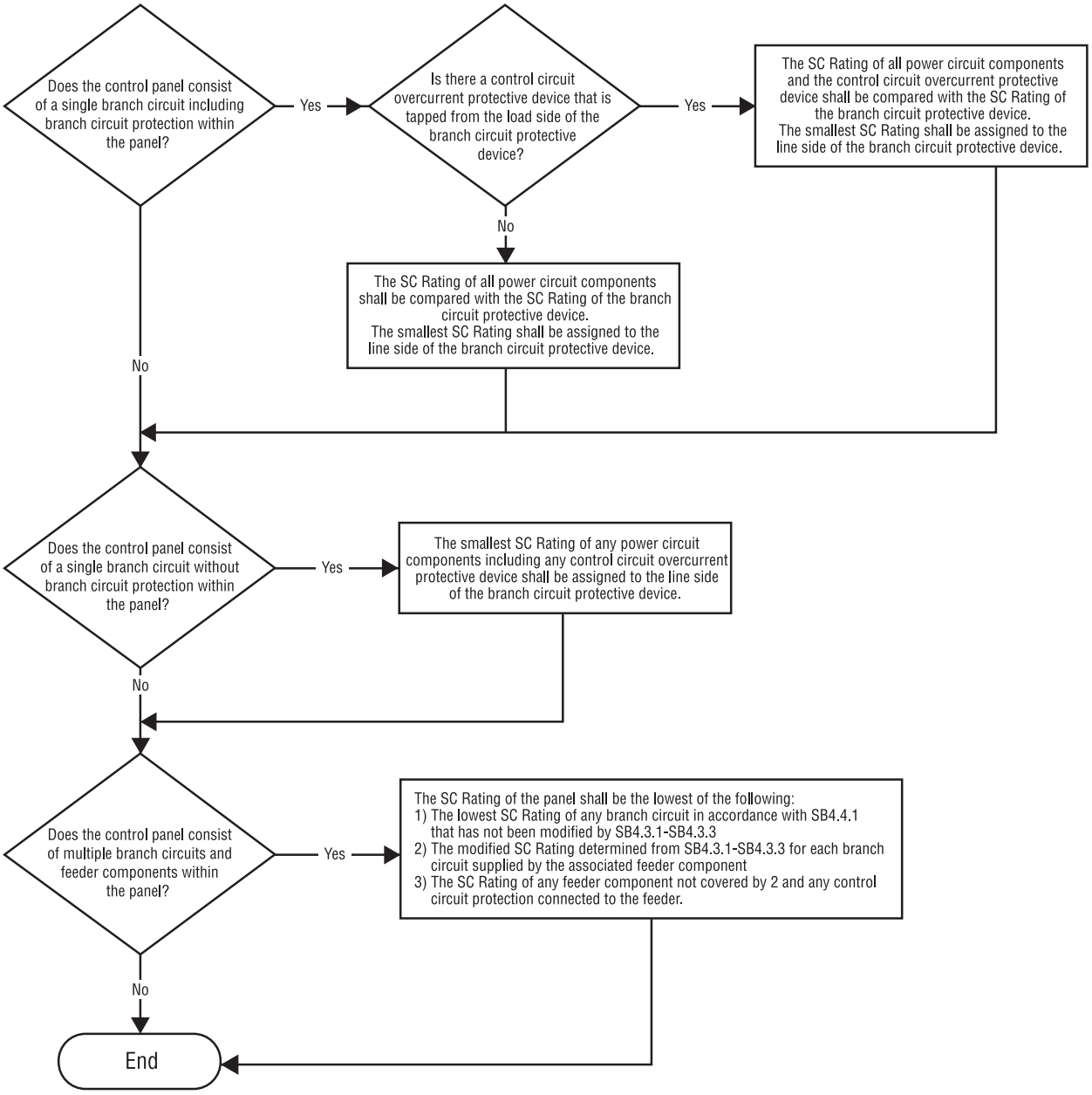
Note: Use for every power circuit component



Feeder Components that Limit the Short Circuit Current Available (UL 508A SB4.3)



Determination of the overall short circuit current rating of the panel (UL 508A SB4.4)



Schneider Electric - North American Operating Division

1415 S. Roselle Road
Palatine, IL 60067
Tel: 847-397-2600
Fax: 847-925-7500
www.us.squared.com/ul508a