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NFPA 79 – Changes in Edition 2018

Effects on the electrical equipment of machinery for the U.S. market

White Paper I May 2018

The NFPA 79 (Electrical Standard for Industrial Machinery) is an important standard for electrical equipment of machinery on the U.S. market. In recent years the National Fire Protection Association (NFPA) has worked on a new version, which was published in November 2017 as Edition 2018. This white paper provides an overview of important changes in the new standard.

A white paper from: Siemens.

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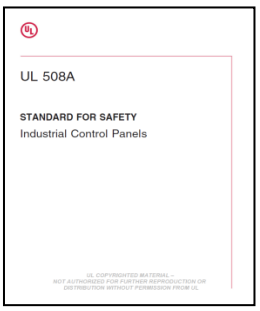
Connection between NEC and NFPA 79

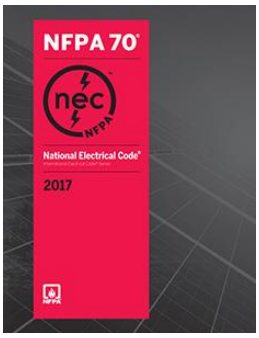
The National Electrical Code (NEC) is deemed to be the overriding code for electrical installations in the USA. The NEC is legally recognized as state of the art. It must therefore be strictly adhered to and serves as the basis for approval by the AHJ (Authorities Having Jurisdiction). Electrical equipment is not permitted to be put into operation in the USA without approval of the AHJ.

A new version of the NEC is published by the NFPA as NFPA 70 every three years. The current version is NEC 2017.

Article 670 of the NEC specifically addresses "Industrial Machinery". For additional information, the NEC refers to the NFPA 79 – Edition 2015, which was replaced by Edition 2018 in November 2017.

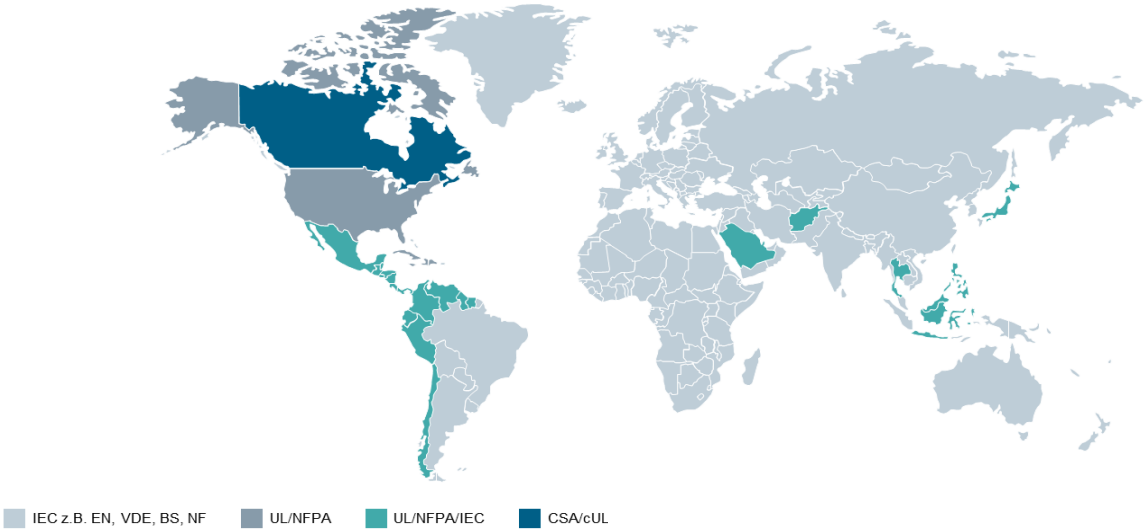
NFPA 79 together with UL 508A (Industrial Control Panels), to which the NEC refers in Article 409, forms an important basis for ensuring compliance with the technical requirements for electrical equipment of machinery in the USA and in countries that apply U.S. standards.





§Article 670 → **NFPA 79** Industrial Machinery

§Article 409 → **UL 508A** Industrial Control Panels



General information on NFPA 79

Definition of industrial machinery

According to NEC, Article 670.2 and NFPA 79, Chapter 3.3.57, industrial machinery is understood to be a power-driven machine (or a group of machines working together in a coordinated manner), that is not portable by hand whileworking and that is used to process material by cutting, forming, pressure, electrical, thermal or optical techniques, lamination, or a combination of these processes.

The following equipment can be part of the machinery equipment for

- Material transport
- Provision of tools, including fixing elements
- Assembly or disassembly
- Inspection and testing
- Packing

The associated electrical equipment, including a controller with associated software, and associated actuators and sensors are viewed as part of the machinery.

Scope of NFPA 79

NFPA 79:

- applies to the use of electrical and electronic equipment, apparatus and systems of industrial machines with a maximum nominal voltage of 1000 V
- applies commencing at the point of connection of the supply to the machine
- guarantees safety for people and property
- does not apply retroactively, but must be applied to changes (except repairs) of existing machinery
- does not apply to machinery in hazardous areas
- must not be applied to:
  1. fixed or portable tools judgedunder the requirements of a testing laboratory, which is acceptable to the authorities having jurisdiction;
  2. Machinery in dwelling units

Differentiation between NFPA 79 and UL 508A

The scope of NFPA 79 begins at the supply point of the machinery and ends at the loads in the machinery field. The scope of UL 508A begins at the supply point of the control panel and ends at the field wiring terminals to the machinery field.

Because the machine supply and control panel supply generally involve the same supply terminal, it is possible to apply both standards to control panels.

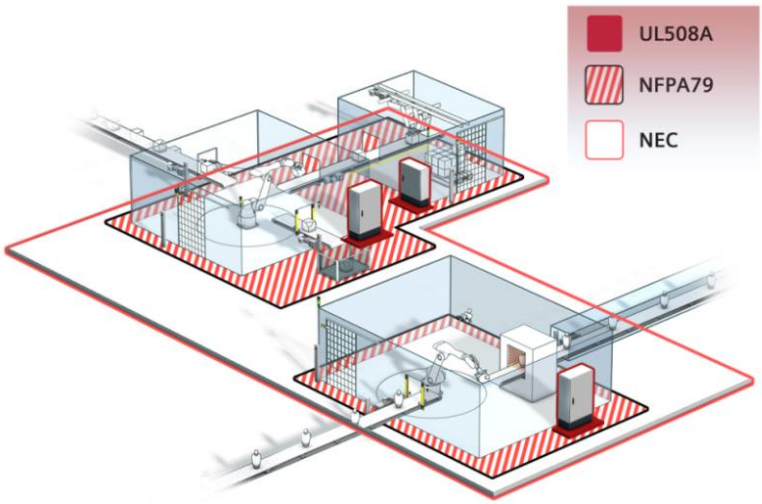
If possible, it should therefore be agreed in advance with the user which standard is relevant. In practice, however, this cannot always be clarified beforehand. In this case, it is recommended to comply with both standards.

This does not pose a major problem because the two standards are not contradictory and most requirements are identical or similar. However, in some cases it can happen that one standard allows less room for interpretation of requirements than the other one. In this case, it is recommended to comply with the more stringent requirement.

Example:

- According to NFPA 79, a maximum of 120 V AC or 250 V DC generally applies to control circuits.
- According to UL 508A, a maximum of 600 V applies to Class 1 control circuits.

→ Voltages according to NFPA 79 are also acceptable according to UL 508A.



Changes in NFPA 79 – Edition 2018

Important changes at a glance

- Adaptation of the maximum voltage to the NECfrom 600 V to 1000 V
- Partial revision of Chapter 3 "Definitions" and Chapter 4 "General Requirements and Operating Conditions"
- Chapter 5 was renamed from "Incoming Supply Circuit Conductor Terminations and Devices for Disconnecting and Removing Power" to "Disconnecting Means" and revised
- New requirements for use of "Surge Protection Devices (SPD)"
- Chapter 8 was renamed from "Grounding" to "Grounding and Bonding" and revised

The following section examines the above-indicated items in more detail.

Increase of maximum voltage to 1000 V

The NEC 2014 distinguishes between electrical equipment up to 600 V and over 600 V. With publication of NEC 2017, voltage ranges have been defined as up to 1000 V and over 1000 V.

In NFPA 79, Edition 2018, the voltage level was adapted to the NEC and likewise increased from from the previous maximum level of 600 V to 1000 V.

Changes in Chapter 3 "Definitions" and Chapter 4 "General Requirements and Operating Conditions"

Chapter 3 of the NFPA 79 describes the meaning of many terms. In Edition 2018, some terms were removed, newly added or revised. The terms "Attachment Plug (Plug Cap) (Plug)", "Receptacle" and "Socket" described in Edition 2015 were removed, while other term definitions such as "Adjustable Speed Drive", were revised in Edition 2018, Chapter 3.3.5.
The following term definitions were newly added in Edition 2018:

- Standard
- Adjustable Speed Drive System
- Basic Protection
- Effective Ground-Fault Current Path
- Fault Protection
- Machine Supply Circuit

The changes in Chapter 4 are limited in scope. However, Chapter 4.3 was newly added. It explicitly indicates that "listed" or "labeled" equipment must be used in accordance with all the instructionsrelated tothe listing and labeling.

New features in Chapter 5 "Disconnecting Means"

Besides the renaming of Chapter 5 to "Disconnecting Means", some of the descriptions have been precised or newley added.

For example, it is not only talked about the incoming supply circuit conductor terminations anymore, but rather about machine supply circuit conductor terminations. The supply circuit disconnecting (isolating) means is now called the machine supply circuit disconnecting (isolating) means.

If a machine is supplied by more than one supply circuit, Chapter 5.3.1.1.1 requires each supply circuit disconnecting means to be marked with a note indicating which part of the machinery is disconnected. This makes it clear to the user that, by disconnecting the respective disconnecting means, the machinery is not completely de-energized and only the respective part of the machinery is disconnected. This rule is not new but was recently expanded in Edition 2018 with the addition of the new Chapter 5.3.1.1.2.

Supply circuit disconnecting means for drive motors

NFPA 79 distinguishes now even more clearly than before between machinery with multiple supply circuits and machinery with only one supply circuit. Thus, according to Chapter 5.3.1.1.2, the main disconnecting means of machinery with only one supply circuit, which hasadditional disconnecting means on the output side, i.e. to disconnect parts of the machine, must now be marked as "Machine Supply Circuit Disconnect". This makes it clear to the user that, by disconnecting the main disconnecting means, the machinery, possibly with the exception of circuits tapped upstream of the main switch (e.g. for lighting), is completely de-energized.

Supply circuit disconnecting means for machine supply circuit

The exceptions have also been specified in more detail in Chapter 5.3.1.3. This part of NFPA 79 requires that the supply circuit disconnecting means of each power supply circuit with the exception of plug / socket combinations must be mounted within the control panel enclosure itself or directly adjacent to the enclosure.

There are two exceptions, however. These allow the supply circuit disconnecting means of feeders for control panels to be mounted up to 6m or 20ft away from the control panel enclosure. The prerequisite is that the supply circuit disconnecting means must be in sight of the control panel enclosure and be easily accessible. Door interlocking is optional for a control panel power of less than or equal to 2 hp. Over that value, the control panel doors must be interlocked with the main disconnecting means.

These exceptions also existed in Edition 2015. However, the requirement that the location of the supply circuit disconnecting means has to be marked on the control panel enclosure is a new addition.

Possible exceptions related to door interlocking

The first exception in Chapter 5.3.1.4 represents another important change. This chapter specifies that all control panels, which include supply circuit disconnecting means within the enclosure itself or directly adjacent to the enclosure, must be interlocked in order to limit the access only to qualified persons.

However, the first exception allows that an enclosure that prevents direct access to devices (other than handles of circuit breakers or switches) through a dead-front cover is not required to be interlocked with the supply circuit disconnecting means. The prerequisite is that the enclosure can be opened only with a key or a tool and that a corresponding safety sign is attached to the enclosure in accordance with Chapter 16.2. The sign must draw attention to the fact that the enclosure contains live components and access to the enclosure is limited to qualified persons only.

Overvoltage protection devices for safety interlock circuits

Another important change in NFPA 79 Edition 2018 compared to Edition 2015 refers to the use of surge protection devices (SPDs).

While Chapter 7.8.1 of Edition 2015 allowed, but did not prescribe, the use of SPDs, Edition 2018 explicitly requires SPDs for circuits that supply safety interlock circuits.

Find out morre about overvoltage protection devices under siemens.com/overvoltage-protection.

Summary

Overall, it can be stated that there are no drastic changes in the new Edition 2018, but predominantly formulations or specification of some requirements. In addition, it can be observed that NFPA 79 and IEC 60204-1 resemble gradually more and more, which certainly makes things easier for manufacturers operating internationally.

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Siemens Industry, Inc.
Digital Factory Control Products

5300 Triangle Parkway NW

Norcross, GA 30092