



# Industrial Control Panels for North America

## Important Changes in the UL 508A 3<sup>rd</sup> Edition Standard for Industrial Control Panels

### White Paper | November 2018

Standards are regularly updated to reflect the state of the art. Accordingly, the new 3<sup>rd</sup> Edition of UL 508A was published in April 2018.

To ensure that industrial control panels intended for use in the U.S. market meet the applicable requirements, electrical designers must take changes to the relevant standards into account.

This white paper provides an overview of important changes and additions in UL 508A 3<sup>rd</sup> Edition.

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# Historical development of UL 508A

## Product standards of UL

UL (Underwriters Laboratories Inc.®) publishes product standards that manufacturers from around the world test their products against so that they can be used in electrical installations for buildings and machinery in conformance with U.S. laws and regulations.

Examples of relevant product standards are:

- Fuses according to UL 248
- Contactors according to UL 508
- Circuit breakers according to UL 489

Until 2001 there was not a dedicated industrial control panel standard in the United States. For this reason, the UL 508 Standard for Industrial Control Equipment was used instead for the design and use of products in industrial control panels. However, because this is a standard for control equipment, such as overload relays, contactors and motor protection circuit breakers, the standard had shortcomings with regards to industrial control panels.

## Publication of the 1<sup>st</sup> Edition of UL 508A

Because the UL 508 Standard for Industrial Control Equipment lacked crucial details needed for its use for industrial control panels, UL published the 1st Edition of the UL 508A Standard for Industrial Control Panels in April 2001. This standard specifically addresses aspects that are relevant to the design and rating of components within industrial control panels. The standard is structured and divided as follows:

### Part 1 – General Use Industrial Control Panels

Basic requirements that apply to all industrial control panels

### Part 2 – Specific Use Industrial Control Panel Types

Requirements for specific uses

### Supplement SA – Specific Component Requirements

Specific requirements for listed and unlisted components

### Supplement SB – SCCR for Industrial Control Panels

Method for determining the short-circuit current rating

### Appendix A – Standards for Components

List of the referenced standards

### Appendix B – Use of Unlisted Components

Method for using components that are neither UL Listed nor UL Recognized in industrial control panels.

Since publication of UL 508A, a suitable standard has been available for engineering of individual industrial control panels.

## Publication of the 2<sup>nd</sup> Edition of UL 508A

Twelve years later in December 2013, UL published a revised 2nd Edition of UL 508A. The main changes concerned the following sections:

### Supplement SB: Short Circuit Current Ratings for Industrial Control Panels:

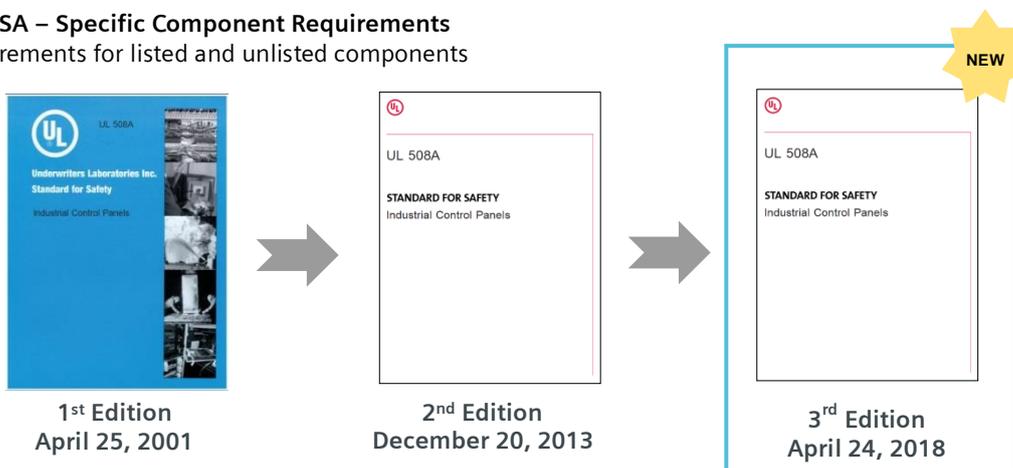
- SCCR exception for components in the power circuit
- New calculation options for transformers as "current limiting" components
- Specifics of the SCCR determination using tested combinations

In addition, two new specific use industrial control panel types were added:

- Fountain control panels
- Industrial control panels for irrigation equipment

## Publication of and changes in the 3<sup>rd</sup> Edition of UL 508A

The 3<sup>rd</sup> Edition of UL 508A was published in April 2018. Several sections and subject areas have been updated.



# Important new features of UL 508A 3<sup>rd</sup> Edition at a glance

## 1. Requirements for components and devices

The appendix SA1 to SA3 including all tables SA1.1 to SA1.3 was completely removed from UL 508A.

The link <http://www.ul.com/UL508A-SupplementSA> to the UL website was set up for this.

All relevant product information for industrial control panels can be viewed on this area of the UL website at any time. All earlier references in UL 508A to Supplement SA have been replaced with this link. This allows the contents to be adapted and updated independent of UL 508A.

The 3<sup>rd</sup> Edition of UL 508A has also been recognized by ANSI.



## 2. Adaptation of the permissible voltage range to the NEC

The low voltage definition has been formally adapted to the NEC and NFPA 79.

However, implementation of this is still difficult because:

- Most components are tested for a maximum of 600 V
- Most dimensioning rules in the standards and codes still only provide for a maximum operating voltage of 600 V.

## 3. Uniform designation of surge protective devices

Surge protective devices were previously designated as varistors, suppressors and arresters. They have now been uniformly designated in sections 2.36 and 2.47 to 2.51 that define their UL-specific classification (Type 1 to Type 5; "one-port and two-port") including electrical characteristics. The use of these surge protective devices is covered in section 36.4 for the power circuit and section 47.1 for the control circuit.

Table 2 was added at <http://www.ul.com/UL508A-SupplementSA>, to provide a clear summary of the use of the Type 1 to 5 surge protective devices.

Of course, the surge protective devices must be listed according to UL 1449 and according to the Code Category Number (CCN) "VZCA".

## 4. New details regarding use of ferrules

Details regarding use of ferrules have been newly added in section 29.3.6 ("Wiring methods").

Ferrules may now be used subject to the following conditions:

- 4.1. Only allowed for stranded copper wires.
- 4.2. The connecting terminals of the components must be approved for copper wires and, of course, for the number and sizes of crimped wire ends. (Observe manufacturer specifications!)
- 4.3. The ferrule may only be crimped with an appropriate tool as recommended by the ferrule manufacturer.
- 4.4. The diameter of the ferrule must be selected dependent on wire size and number of wires according to manufacturer specifications. AWG specifications must be observed if applicable.
- 4.5. It must be ensured during installation that the required clearances and creepage distances are not reduced by the ferrule. This means that exposed copper wire is not permitted between the ferrule and insulation.

## 5. SCCR determination in the power circuit

5.1 The components that are not included in the overall SCCR calculation have been revised. These can be found in the following exceptions under SB4.2 in UL 508A.

**Exception 1:** One-port SPDs

**Exception 2:** No changes

**Exception 3:** Air conditioners that are cord-and-attachment-plug connected.

**Exception 4 (NEW!):** Ferrules, if installed correctly. For information on this, see section 29.3.6 a-e.

**Exception 5 (NEW!):** EMC filters before and after converters

5.2 Table SB4.1 for standard SCCR values was expanded for the following components with max. 10 kA:

- Plug-in connectors for data, control circuits and power circuits
- Prefabricated cables and cable terminals
- Connecting terminal blocks for power circuits

**5.3** High fault SCCR values of industrial control panel components that have been achieved by means of combination tests: If the protective device being tested is a "non-current limiting overcurrent device", it can be replaced with a fuse from Table SB4.2 with the same or lower rated current if the short-circuit breaking capacity is greater than or equal to the tested SCCR of the combination.

**5.4** The values in table SB4.4 for determining the secondary short-circuit current of a current-reducing 3-phase transformer have been corrected to lower values.

**5.5** The SCCR of the industrial control panel must be written on the nameplate with the following words:

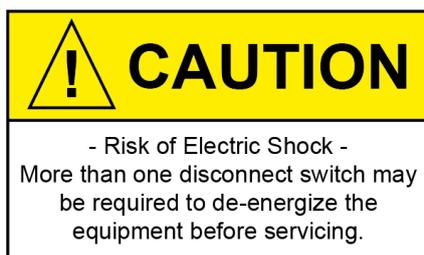
*Short circuit current rating: \_\_\_kA rms symmetrical, \_\_\_V maximum"*

## 6. Marking when more than one disconnect switch is used

According to section 30.3.5, it is permissible for the industrial control panel to have more than one incoming supply if each incoming supply has its own disconnect switch and these are grouped as locally as possible.

For each disconnecting device, a marking must be provided indicating which part of the electrical equipment will be disconnected. If the disconnect switches cannot be grouped, a marking must also be provided indicating where the other disconnecting devices are located.

Note: Of course, in the case of multiple disconnecting devices or use of excepted circuits (see item 7), the following safety notice must continue to be mounted where it can be easily read from the outside without opening the door:



## 7. Excepted circuits

Up to now, only circuits for lighting in the control panel and for data backup were designated and thus had to be supplied upstream of the actual disconnecting device. Twelve additional circuits have been added to the exceptions in section 66.6.1.

With regards to marking, the new section 66.6.4 was added to regulate the color marking of excepted circuits. Conductor color "orange" or warning signal:



An easily visible safety notice must also be mounted indicating that the control panel contains circuits that can still be live after the main disconnect switch is off. (See warning notice in item 6).

## 8. Increase of maximum DC voltage in the "low-voltage limited energy circuit"

The low-voltage limited energy circuit has been increased from 41.4 V DC to 60 V DC. The maximum output power of 100 W must still be adhered to and a corresponding fuse protection must be provided. The current is thereby limited to a maximum of 5 amperes.

## 9. Extension of degree of protection of enclosures

Table 19.2 for Enclosure Types was expanded to include 6P degree of protection components for Type 4X enclosure.

## 10. Separate sections for several components and their use

The following components and their use are now covered in separate sections:

### Section 28.7:

Plug-in connections in the power circuit tested according to UL 2237

### Section 37.8:

Plug-in connections in the control circuit tested according to UL 2238

### Section 28.2.5:

Plug-in connectors with CCN "ECBT2" are permitted if they are tested according to UL 1977 and conform to the requirements in table 2 on the website <http://www.ul.com/UL508A-SupplementSA>.

### Section 34.1.4:

Motor protection circuit breakers

These protective devices are approved and can be used according to UL 489 like a circuit breaker. Simultaneously, they can also take over the overload protection for the motor like a Type E combination motor controller.

### Section 36.3:

Reactors

This new section clarifies the use of reactors that are based on the test standards for transformers.

### Section 47.3:

Uninterruptible Power Supply (UPS)

UPS devices must be tested according to UL 1778 and the control panel must be force-ventilated unless the UPS has a sealed design.

When a UPS with voltage greater than 50 V is used in the control panel, the following warning as defined in section 55.8 must be mounted on the door.



#### **Sections 105 – 109:**

Control panels for swimming pools and in-ground spas

#### **Sections 110 – 114:**

Control panels for water park rides and similar installations

### **11. Position of the control panel nameplate**

The nameplate must now be mounted where it can be seen from the outside without opening the door.

### **12. Marking of the setting values of overload relays**

All overload relays must be marked with the respective setting values at the installation location.

### **13. Revised rating of the largest main overcurrent protective device**

The rating of the largest main overcurrent protective device according to section 66.7.4 for industrial machinery has been revised. The rating is as follows: Rated current of the branch circuit protective device (BCPD) of the largest motor feeder plus the rated currents of all other motor and non-motor loads that are in operation at the same time.

*1.25\*FLC of all heating + 1.25\*FLC of largest motor +  $\Sigma$ FLC of all remaining loads that are in operation at the same time.*

### **14. New rules for door interlocking**

Previously, closing of the disconnect switch had to be prevented when any door was open. The new edition only requires that closure of the disconnect switch be prevented when the door of the enclosure containing the disconnect switch is open. Conversely, this means that when any door except the door of the enclosure containing the disconnect switch is open, the equipment can be switched on.

However, it is not possible to forego the door interlocking of any door because it is still true that no door is allowed to be opened while the equipment is switched on as soon as dangerous contact voltages  $\geq 50$  V AC or  $\geq 60$  V DC are present.

### **15. Three new topics in Part 2 of UL 508A (Specific Use Industrial Control Panel Types)**

Three new topics have been added in Part 2 of UL 508A.

#### **Sections 100 – 104:**

Control panels for aquatic playgrounds

# More information from Siemens

## Siemens keeps you up-to-date.

Whether you are looking for reference works, web-based training courses, helpful engineering tools or useful information on panel building, you will find comprehensive information on "expert know-how", "tools and data for digitalization in engineering" and "aligned product and system portfolio" on our market portal for panel building:

[usa.siemens.com/controlpanels](http://usa.siemens.com/controlpanels)

## Still have questions or need additional support?

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