

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Industrial Control Panels, UL 508A, are being proposed:

- 1. ECBT2 Connectors in Control Circuits**
- 2. SCCR for EMI Filters in Panels**
- 3. Use of Male-type Receptacles in Panels**
- 4. Sizing of Branch Circuit Protection for Heater Loads**
- 5. Emergency Stop Devices in Panels**
- 6. Wire Positioning Devices in Panels**
- 7. Sizing the Feeder: same approach for all Panels**
- 8. Sizing the Feeder**
- 9. Correct table 52.1 to allow markings to be in the inside of a panel**
- 10. SB 4.3.3 - Addition of Class CFI**
- 11. 55.4 Multiple Disconnect sign**
- 12. Revision to Section 55 - Markings**
- 13. Revision of 31.4.1(c) to correlate with NEC 430.53(C)(1)**
- 14. Bus Bar Construction Requirements for 100kA SCCR without testing**
- 15. Door interlocking / Restricted Access to Enclosures**
- 16. Color Coding**
- 17. Correction of 700A Class T fuse leththrough in Table SB4.2**
- 18. Add UL 61010-2-201 to Par. 42.2.3.1 Ex. 2**

STP BALLOTS AND ALL COMMENTS DUE: August 27, 2018

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~.

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1. ECBT2 Connectors in Control Circuits

BACKGROUND

This was agenda item 10 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

The use of ECBT2 connectors was added to the second edition of UL 508A. However, the revisions only allowed these connectors to be used in power circuits. Not including these connectors for use in control circuits was an oversight. Revisions to include this use are being proposed.

PROPOSAL

37 Field Wiring Terminals

37.1 Component requirements

37.1.1 A field wiring terminal for connection to a control circuit shall comply with 28.2.1 – 28.2.3.

Exception: A terminal that complies with 37.4.1 or the Exception to 37.3.1 is not required to comply with this requirement.

37.1.2 Component Connectors for Use in Data, Signal, Control and Power Applications shall comply with 28.2.5.

2. SCCR for EMI Filters in Panels

BACKGROUND

This was agenda item 11 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

A Certification Requirement Decision related to electromagnetic interference filters, such as an EMI, RFI, or line filter was issued on March 31, 2017. Based on feedback from UL staff and customers, revisions to the requirements are being proposed to require these filters to have a short circuit current rating when used on the line-side of a variable-speed drive. The requirement to exempt these devices from having a short circuit current rating when used on the load-side of a variable-speed drive will be retained.

PROPOSAL

SB4.2 Short circuit current ratings of individual power circuit components

SBX4.2.1 All power circuit components, including disconnect switches, branch circuit protective devices, branch circuit fuseholders, load controllers, motor overload relays, terminal blocks, and bus bars, and electromagnetic interference filters, such as an EMI, RFI, or line filter used on the line-side of a variable-speed drive shall have a short circuit current rating expressed in amperes or kiloamperes and voltage.

Exception No. 1: Power transformers, reactors, current transformers, dry-type capacitors, resistors, varistors, and voltmeters are not required to have a short circuit current rating.

Exception No. 2: The "S" contactor of a wye-delta motor controller is not required to have a short circuit current rating.

Exception No. 3: Enclosure air conditioners that are cord-and-attachment-plug connected are not required to have a short circuit current rating.

Exception No. 4: Wiring ferrules are not required to have a short circuit current rating, provided that the requirements of 29.3.5A are met.

Exception No. 5: Electromagnetic interference filters, such as an EMI, RFI, or a line filter used on the line or load-side of power conversion equipment are not required to have a short circuit current rating.

3. Use of Male-type Receptacles in Panels

BACKGROUND

This was agenda item 12 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

UL has received requests to allow receptacles intended for connection to a power supply to be of a male type or of a construction where current-carrying parts are exposed. The current requirements specify the receptacle to be a female type to eliminate a potential shock hazard when the receptacle is supplying power. When the receptacle is intended for connection to a power supply exposed parts of the receptacle would not present a shock hazard. Section 28.6 is proposed to be revised to allow this application.

PROPOSAL

28.6 Receptacles

28.6.1 A general-use grounding type receptacle and a multi-pin type receptacle shall comply with the requirements in the Standard for Attachment Plugs and Receptacles, UL 498 or Appliance Couplers for Household and Similar General Purposes - Part 1: General Requirements, UL 60320-1.

28.6.2 A multi-pin receptacle mounted through an enclosure wall shall additionally:

a) Be provided with a metal housing or comply with the polymeric enclosure requirements in the Standard for Industrial Control Equipment, UL 508;

b) Be a female type;

Exception: A receptacle intended for connection from an external power source may be a male type or of a construction where current-carrying parts are exposed.

c) Comply with 28.5.8; and

d) Be marked in accordance with 59.2 and 59.4.

4. Sizing of Branch Circuit Protection for Heater Loads

BACKGROUND

This was agenda item 14 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

PROPOSAL

31.6 Sizing of branch circuit protection for heater loads

31.6.1 Fixed electric space-heating equipment Resistance-heating-element loads shall be provided with branch circuit protection sized:

a) ~~Not less than 125 percent of the heater load current;~~

b) ~~a)~~ Not larger than 60 amperes; and

e) ~~b)~~ Not larger than the ampacity of the field wiring to the heater load.

~~Exception No. 1: Resistance-heating-element loads contained in a water heater or steam boiler having an ASME-rated and stamped vessel are not required to comply with this requirement. See 31.6.2.~~

~~Exception No. 1: Branch circuit protective devices rated more than 60 amperes are able to be used within the industrial control panel when the field wiring diagram specifies additional branch circuit protective devices rated at not more than 60 amperes are to be provided in the field. See 60.1.~~

~~Exception No. 2: For heaters used for pipelines and vessels or outdoor de-icing and snow melting where the heater is not able to be subdivided into circuits less than 48 amperes, the branch circuit protective device is required to be sized in accordance with 31.6.1 ~~b)~~(a) and (e) only.~~

~~Exception No. 3: Branch circuit protective devices rated more than 60 amperes are able to be used within the industrial control panel when the field wiring diagram specifies additional branch circuit protective devices rated at not more than 60 amperes are to be provided in the field. See 60.1.~~

31.6.2 The maximum branch circuit protective device shall be 150 amperes for resistive heating element loads contained in a water heater or steam boiler having an ASME rated and stamped vessel. The load rating shall comply with 50.5.

31.6.3 Branch circuit protection for industrial process heating employing electric resistance or electrode heating technology including boilers, electrode boilers, duct heaters, strip heaters, immersion heaters, process air heaters, or other fixed electric equipment used for industrial process heating shall be sized based on the ampacity of the conductors supplying this equipment.

31.6.4 Branch circuit protection for dielectric heating, induction heating, induction melting, and induction welding equipment and accessories for industrial and scientific applications shall be sized based on the ampacity of the conductors supplying this equipment.

5. Emergency Stop Devices in Panels

BACKGROUND

This was agenda item 17 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

UL has previously discussed with the STP the issue of requiring emergency stop buttons for industrial machinery panels to be certified. UL would like to revisit this subject considering the recent publication of a new standard covering emergency stop buttons. This standard is UL 60947-5-5 Low-voltage Switchgear and Controlgear - Part 5-5: Control Circuit Devices and Switching Elements - Electrical Emergency Stop Device with Mechanical Latching Function. The standard was published on August 11, 2017. The following proposal was drafted to address this issue.

PROPOSAL

66.11 Operator controls

66.11.1 Start operators shall be located above or to the left of the associated stop buttons.

Exception: Start buttons in series, such as for two-handed control, are not required to comply with this requirement.

66.11.2 An industrial control panel provided with operator controls, such as pushbuttons and selector switches, shall also be provided with an emergency stop button.

66.11.3 The emergency stop button shall ~~have an actuator that is a mushroom or palm type, and of the self-latching type~~ comply with the requirements in the Standard for Low-voltage Switchgear and Controlgear - Part 5-5: Control Circuit Devices and Switching Elements - Electrical Emergency Stop Device with Mechanical Latching Function, UL 60947-5-5.

6. Wire Positioning Devices in Panels

BACKGROUND

This was agenda item 21 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: John Kovacik, UL LLC.

John Kovacik presented a proposal on wire positioning devices at the November 9–10, 2016 STP meeting. Some meeting attendees expressed concern with certification requirements for cable ties and cable – tie mounts. It was noted that the members in attendance agreed there was a need requirements for ducts when used for separation of circuits, but there is no need for requirements for cable ties. Based on feedback from the STP a proposal has been drafted addressing the use of ducts in panels.

PROPOSAL

29.5 Separation of circuits

29.5.1 A factory-installed conductor shall be separated by a barrier or by additional insulation complying with 29.2.3, or shall be segregated as specified in 29.5.2 from:

- a) A factory-installed conductor used in a different circuit unless the conductors of both circuits are insulated for the maximum voltage of either circuit; and
- b) An uninsulated live part connected to a different circuit.

29.5.2 Segregation of a conductor shall be accomplished by clamping, routing, or equivalent means that provides permanent separation from a conductor or an uninsulated live part of a different circuit.

29.5.3 A conductor shall be provided with strain relief in accordance with 28.5.2 when stresses on the conductor cause the conductor to move such that compliance with 29.5.1 is not maintained.

29.5.4 A wiring duct which is used to provide separation or segregation in accordance with 29.5.1 shall comply with the requirements in the Standard for Positioning Devices, UL 1565.

7. Sizing the Feeder: same approach for all Panels

RATIONALE

Proposal submitted by: Marco Tacchini, - GT ENGINEERING

Why is there a difference between NEC and UL for sizing the feeder protection of Industrial Control Panels? I compare Article 66.7.4 with NEC Article 409.21. Moreover Why that rule is not applicable to all Industrial Control Panels. The proposal is to have the same rule for sizing the feeder protection for all Industrial Control Panels, consistent with Article 409.21 of the NEC.

The proposal is to align article 32.3.1 of UL 508A with NEC Article 409.21(A) and delete Article 66.7.4. Articles 66.7.5 and 66.7.6 need to be re-numbered, if the proposal is accepted.

Please notice the importance of the Exception No 3. It is the same language as the exception in Article 409.21(C).

Please see supporting documentation in the CSDS work area, where a table is shown that summarizes the key modification of this change proposal

PROPOSAL

32.3 Sizing of overcurrent protection

32.3.1 The size of the overcurrent protection shall not exceed the ampere value determined from (a) and (b), whichever is larger:

- a) The rating of the largest branch circuit protective device in the circuit plus 125 percent of all heater loads plus the full-load currents of all other motors or other loads in the group that could be in operation at the same time; or
- b) The ampacity of the conductors or bus bars on the load side of the overcurrent device.

Exception No. 1: When branch circuit protection is not provided within the panel, the main overcurrent protection shall comply with Section 31, Branch Circuit Protection, for single motor or heater loads or for a group of loads.

Exception No. 2: Where internal conductors are sized based on the Exception to 66.5.5, the ampere rating of the main overcurrent protective devices shall not exceed the conductor ampacity in Table 28.1.

Exception No. 3: Where one or more instantaneous trip circuit breakers or motor short-circuit protectors are used for motor branch-circuit short-circuit and ground-fault protection as permitted by 31, the procedure specified above for determining the maximum rating of the protective device for the circuit supplying the industrial control panel shall apply with the following provision: for the purpose of the calculation, each instantaneous trip circuit breaker or motor short-circuit protector shall be assumed to have a rating not exceeding the maximum percentage of motor full-load current permitted by Table 31.1 for the type of control panel supply circuit protective device employed.

66.7.4 The main overcurrent protection shall be sized based on the sum of:

- a) The rating of the branch circuit protective device for the highest rated motor in the circuit; and
- b) The full-load currents of all remaining motors and other loads in the circuit that are simultaneously operable.

~~Exception No. 1: When branch circuit protection is not provided within the panel, the main overcurrent protection shall comply with Section 31, Branch Circuit Protection, for single motor or heater loads or for a group of loads.~~

~~Exception No. 2: Where internal conductors are sized based on the Exception to 66.5.5, the ampere rating of the main overcurrent protective devices shall not exceed the conductor ampacity in Table 28.1.~~

8. Sizing the Feeder

RATIONALE

Proposal submitted by: Marco Tacchini, - GT ENGINEERING

Article 32.3.1 has the same requirements as Article 430.62(A) from NEC, however a part is missing. That part makes a difference in case of designing a Type E or F Combination Motor Controller.

Article 66.7.4 has the same requirements as Article 430.62(A) from NEC, but also in this case a part is missing. That part makes a difference in case of designing a Type E or F Combination Motor Controller.

This proposal is to align the requirements, or better, to make them (Art. 32.3.1 and Art. 66.7.4) more complete and in line with Article 430.62(A).

The change has no impact on the cost of the cabinet.

PROPOSAL

32.3 Sizing of overcurrent protection

32.3.1 The size of the overcurrent protection shall not exceed the ampere value determined from (a) and (b), whichever is larger:

- a) The rating of the largest branch circuit protective device in the circuit (based on the maximum permitted value for the specific type of a protective device in accordance with table 31.1) plus the full-load currents of all other motors or other loads in the group; or
- b) The ampacity of the conductors or bus bars on the load side of the overcurrent device.

66.7.4 The main overcurrent protection shall be sized based on the sum of:

- a) The rating of the branch circuit protective device for the highest rated motor in the circuit (based on the maximum permitted value for the specific type of a protective device in accordance with table 31.1); and
- b) The full-load currents of all remaining motors and other loads in the circuit that are simultaneously operable.

9. Correct table 52.1 to allow markings to be in the inside of a panel

BACKGROUND

This was agenda item 4 at the 2017 STP Meeting

RATIONALE

Proposal submitted by: Paul Kowalsky- Rockwell Automation

Correct table 52.1 to allow markings to be in the inside of a panel (and not just outside of panel only):

- 1) Permanency – UL 508A does not address permanency for labels so over time having a label on the outside is not a good idea as the markings will deteriorate to being unreadable.
- 2) The argument for the outside of the panel (only) is to protect users against shock, etc. as they will not need to open the panel to verify the ratings. Users need to open panels in order to replace fuses, do maintenance, adjust settings; i.e. no new risk has been introduced by needing to open the panel to verify ratings.
- 3) We have checked many other alike product Standards, such as UL 98, UL 508, UL 845, etc., and none of them require the markings to be on the outside only. One can build a combination motor controller under UL 508 and have the markings on the inside (visible after installation); but if one does the same device under UL 508A, the marking must now be on the outside.

4) Facility LOTO procedures should identify any sources of power, voltage level for each and maximum available fault current (versus the theoretical maximum the panel is designed for). Since LOTO signage is facility specific, there may be discrepancies with the manufacturer's information on the nameplate. If the manufacturer nameplate is also visible, this could lead to confusion for the maintenance personnel.

5) UL 508A files call for the Listing Mark to be on the inside or outside of the device. One would expect the UL Mark to be in the same location as the nameplate. UL files will need to be changed as such.

6) Art. 409.110 states a marking must be 'plainly visible after installation', but does not state location. It was stated that visible must mean on the outside of the panel. Throughout the NEC, we have items that must be visible, but cannot be on the outside; i.e. can a wire termination be on the outside (as it must be visible)?

The Standard was revised in June 2017 based upon comments made at the Fall 2016 STP meeting. This was discussed as such at the Fall 2017 meeting and proposal to correct this was widely supported. Per an email between John Kovacik and Rockwell Automation: I believe the discussion on my proposal was very favorable; i.e. this would (repeal) the above requirement. **It's my recollection your proposal was supported when discussed at the STP meeting last October 2017.**

PROPOSAL

Table 52.1
Locations of required markings

General description	Location categories (see notes)	
	Enclosed	Open
General markings Nameplate stating: manufacturer, maximum voltage, total FLA, largest motor FLA, phase, frequency, field wiring diagram, environmental type rating, short circuit current rating External load ratings	a <u>and/or</u> b a, b, or e	f e or f

10. SB 4.3.3 - Addition of Class CF

RATIONALE

Proposal submitted by: Dan Neeser- Eaton's Bussmann Business

Class CF has been added to UL 508A, but it was not added to this section, this corrects the oversight.

PROPOSAL

SB4.3.3 For branch circuits supplied by a Class CC, G,CF, J, L, RK1, RK5, or T fuse in the feeder circuit, the short circuit current rating on the line side of the fuse shall be one of the following:

- a) The available short circuit current selected for the feeder fuse, any value up to the interrupting rating, when all of the individual components in the branch circuit have a short circuit current rating not less than the peak let-through current corresponding to the specific fuse class, ampacity and selected available short-circuit current employed from Table SB4.2, and the interrupting rating of all branch circuit protective devices or the short-circuit current

ratings of any combination motor controller on the load side are not less than available short circuit current selected for the feeder fuse. For branch circuit protective devices not marked with an interrupting rating, or for combination motor controllers not marked with a short-circuit current rating, the values in Table SB4.1 shall be used;

b) The smallest interrupting rating of any branch circuit protective device or the short circuit current rating of any combination motor controller on the load side of the feeder fuse, when the conditions of SB4.3.3(a) exist except the interrupting rating of the branch circuit protective devices or the short circuit current rating of any combination motor controller on the load side are less than the available short circuit current selected for the feeder fuse, any value up to the interrupting rating. For branch circuit overcurrent protective devices not marked with an interrupting rating, or for combination motor controllers not marked with a short-circuit current rating, the values in Table SB4.1 shall be used;

c) The smallest short circuit current rating of any branch circuit on the load side of the feeder fuse, when the conditions of SB4.3.3(a) or SB4.3.3(b) are not met.

11. 55.4 Multiple Disconnect sign

RATIONALE

Proposal submitted by: Dan Neeser- Eaton's Bussmann Business

The correct term should be warning (at a minimum) for this sign. The proposal makes this change.

PROPOSAL

55.4 An industrial control panel intended to be provided with more than one supply source such that more than one disconnect switch is required to disconnect all power within the control panel shall be marked with the word "~~CAUTION~~" "WARNING" and the following or equivalent: "Risk of Electric Shock – More than one disconnect switch may be required to de-energize the equipment before servicing."

Exception: This marking is not required for an isolated control circuit contact that is separately supplied.

12. Revision to Section 55 - Markings

RATIONALE

Proposal submitted by: Dan Neeser- Eaton Bussmann

Since the marking can be either "warning", "danger" or "caution", suggesting a change to the text from "cautionary" to "hazard"

PROPOSAL

55 Cautionary Hazard Markings

55.1 Cautionary hazard markings shall be located on a part that is not removable without impairing the operation or appearance of the equipment.

55.2 A cautionary hazard marking shall be prefixed with the word "CAUTION" or "WARNING," as applicable, in letters not less than 1/8 inch (3.2 mm) high. The remaining letters of such marking, unless otherwise specified, shall not be less than 1/16 inch (1.6 mm) high.

55.3 A cautionary hazard marking intended to instruct the operator shall be legible and visible to the operator during normal operation of the equipment. A marking that provides servicing instructions shall be legible and visible when such servicing is performed.

13. Revision of 31.4.1(c) to correlate with NEC 430.53(C)(1)

RATIONALE

Proposal submitted by: Dan Neeser- Eaton's Bussmann Business

In 2014, NEC 430.53(C)(1) was revised to allow the motor overload device to be either marked for group installations or sized per 430.52. This allows a mixture of devices which may be the case in a group installation. This proposal revises the text in 31.4 to correlate with the NEC.

PROPOSAL

31.4.1 A group of loads, consisting of two or more motors, or one or more motors and other loads, are able to be protected by a single set of branch circuit fuses or inverse – time circuit breaker as specified in (a), (b), or (c):

a) When the branch circuit protection does not exceed 20 A, 125 V or 15 A, 600 V or less; and

1) The full load current rating of each motor does not exceed 6 A; and

2) The rating and type of the branch circuit protection is coordinated with component restrictions in 31.3.1(b); and

3) The rating and type of the branch circuit protection is coordinated with the requirements for other loads in 31.4.4;

b) When the rating and type of the branch circuit protective device complies with 31.3.1 for each motor circuit in the group, the tap conductors comply with 31.4.3, and the rating and type of the branch circuit protection is coordinated with the requirements for other loads in 31.4.4; or

c) When all power circuit devices included on the load side of the branch circuit protection are either (a) intended for group installation, as determined by a marking on the component, the heater table of an overload relay, or on instructions provided with the components, or (b) the rating and type of the branch circuit protective device complies with 31.3.1 for each motor circuit, the tap conductors comply with 31.4.3, and the rating and type of the branch circuit protection is coordinated with the requirements for other loads in 31.4.4 and the size of the branch circuit protection does not exceed the rating determined by (1) or (2), whichever is smaller:

1) Size of branch circuit protection is determined by determining the size required for the largest motor in the group, in accordance with 31.3.1(a) and adding the full-load ampere ratings of all remaining motors and the current ratings of all other non-motor loads in the grouping; or

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