

Subject 98

September 7, 2018

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Enclosed and Dead-Front Switches, UL 98 are being proposed:

- 1. Revisions for Field Installed Barriers***
- 2. Addition of Requirements for Class CA, CB and G Fuses***
- 3. Revisions for the Addition of Voltage Ratings From 601 to 1000 V***

STP BALLOTS AND ALL COMMENTS DUE: October 22, 2018

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

1. Revisions for Field Installed Barriers

RATIONALE

Proposal submitted by: Danish Zia, Underwriters Laboratories LLC

With the growing use of DC rated switches in alternative energy applications, the use of poles in series requires barriers and/or jumpers to be used in different numbers for different configurations. This proposal allows for the barriers and jumpers to be installed in the field as required for the particular installation.

While it is understood it may be a hardship to permanently attach the instructions required for this change, it must be clear to the installer and/or AHJ the barriers are required even after the installation instructions of the kit have been disposed of.

PROPOSAL

6.1.3 A switch may have provision for factory- or field-installed accessories such as neutral assemblies or auxiliary switches provided that:

- a) The switch is for use with and without such assemblies,
- b) Each accessory is acceptable for the intended use,
- c) Each accessory can be installed without the disassembly of factory-assembled parts and without the use of a special tool unless such a tool and instructions for its use are furnished with each accessory,

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d) A barrier that is necessary because spacings would otherwise be less than required, or for any other reason, is either:

i) Securely attached at the factory to either the switch or to the accessory to be installed, or

ii) Provided in the form of a kit made available by the manufacturer that complies with 6.1.7 and 6.1.8.

e) The accessory is an essentially complete unit and does not require detailed assembly in the field. Cutting, splicing of existing wires, or resoldering of connections shall not be permitted, and

f) The accessory and switch are marked in accordance with 9.2.47.

6.1.7 A DC rated multipole switch that requires poles to be wired in series and allows for different series configurations of the poles, barriers and/or jumpers may be field installed if all of the following are met:

a) Barriers are either supplied with or made available by the manufacturer as part of a kit.

b) Jumpers, if other than wire, are supplied with the barriers mentioned in a) or made available by the manufacturer as part of the kit.

c) The kit complies with 6.1.3 c), e), and f).

d) The kit contains all required hardware, and

e) Instructions for the use of barriers and/or jumpers are permanently marked on the switch for each of the different configurations. In lieu of applying all markings to the switch, a separate document shall be included with the switch and the switch shall be marked with a permanently affixed label that reads: "For the proper configuration of connections of the terminals, refer to Publication No. _____ provided with this switch. If additional information is necessary, contact _____ (switch manufacturer's name)." The document shall include:

a) The switch manufacturer's name and type designation or equivalent.

b) Publication number and date or equivalent.

c) Switch electrical ratings, number of poles, and,

d) A schematic of each of the intended wiring configurations for each marked rating

6.1.8 If the manufacturer's instructions specify the installer is to provide the wire, detailed information as to the wire size, insulation type, length, strip length, and physical configuration shall be provided. If the instructions require the building wire to be bent with a radius less than the cold bend mandrel requirements of Annex A, Ref. No. 17, the jumpers shall be provided with the switch or kit as required in 6.1.7.

9.2.47 If, in accordance with 6.1.3 or 6.1.7, an accessory is shipped from the factory separately from or included with the switch for which it is intended to be used:

- a) The accessory or kit shall be marked with its own catalog number or the equivalent and with the name or trademark of the manufacturer and, except for neutral assemblies, with the electrical rating.
- b) The switch shall be marked to indicate the catalog number or the equivalent of each of the accessories or kit(s) that are for use with it. In the case of neutral assemblies, the switch shall also be marked with an indication of the voltage ratings for which the neutral assembly must be used.
- c) Installation instructions shall be furnished with the accessory or kit ~~unless the construction makes the installation obvious~~. Instructions for wiring of an accessory or kit and installation of barriers and/or jumpers shall be permanently attached to the enclosed switch or to the accessory so as to be visible after installation. Also, see 6.1.7 e).

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ANNEX A (normative)**Referenced Standards**

Where reference is made to other organization's standards, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this standard was approved.

Ref. No.	United States	Canada	Mexico
1	ANSI/NFPA 70, National Electrical Code	CSA C22.1, Canadian Electrical Code, Part I	NOM-001-SEDE, Electrical installations (utility)
2	ASTM D3638, Standard Test Method for Comparative Tracking Index of Electrical Insulating Materials	CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials	No equivalent
3	ASTM D3874, Standard Test Method for Ignition of Materials by Hot Wire Sources	CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials	No equivalent
4	UL 50, Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations	CSA C22.2 No. 94-1 – Enclosures for Electrical Equipment, Non-Environmental Considerations	NMX-J-235/1-ANCE, Enclosures for electrical equipment – Part 1 General requirements NMX-J-235/2-ANCE, Enclosures for electrical equipment – Part 2 Specific requirements
5	UL 94, Standard for Test for Flammability of Plastic Materials for Parts in Devices and Appliances	CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials	No equivalent
6	UL 486A-486B, Standard for Wire Connectors	CSA C22.2 No. 65, Wire Connectors	No equivalent
7	UL 969, Standard for Marking and Labeling Systems	CSA C22.2 No. 0.15, Adhesive Labels	No equivalent
8	UL 4248-1, Standard for Fuseholders – Part 1: General Requirements UL 4248-4, Standard for Fuseholders – Part 4: Class CC UL 4248-5, Standard for Fuseholders – Part 5: Class G UL 4248-6, Standard for Fuseholders – Part 6: Class H UL 4248-8, Standard for Fuseholders – Part 8: Class J UL 4248-9, Standard for Fuseholders – Part 9: Class K UL 4248-11, Standard for Fuseholders – Part 11: Type C (Edison Base) and Type 2 Plug Fuse UL 4248-12, Standard for Fuseholders – Part 12: Class R UL 4248-15, Standard for Fuseholders – Part 15: Class T	CSA C22.2 No. 39, Fuseholder Assemblies, or as applicable CSA C22.2 No. 4248.1, Fuseholders, General Requirements CSA C22.2 No. 4248.4, Fuseholders, Class CC CSA C22.2 No. 4248.5, Fuseholders, Class C CSA C22.2 No. 4248.6, Fuseholders, Class H CSA C22.2 No. 4248.8, Fuseholders, Class J CSA C22.2 No. 4248.9, Fuseholders, Class K CSA C22.2 No. 4248.11, Fuseholders, Type C and Type 2 CSA C22.2 No. 4248.12, Fuseholders, Class R CSA C22.2 No. 4248.15, Fuseholders, Class T	NMX-J-098/4248/1-ANCE, NMX-J-098/4248/4-ANCE NMX-J-098/4248/5-ANCE NMX-J-098/4248/6-ANCE NMX-J-098/4248/8-ANCE NMX-J-098/4248/9-ANCE No equivalent NMX-J-098/4248/12-ANCE NMX-J-098/4248/15-ANCE

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Ref. No.	United States	Canada	Mexico
9	UL 746C, Standard for Polymeric Materials – Used in Electrical Equipment Evaluations	CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials	No equivalent
10	UL 746A, Standard for Polymeric Materials – Short Term Property Evaluations	CSA C22.2 No. 0.17, Evaluation of Properties of Polymeric Materials	No equivalent
11	ASTM E28-67(1982), Test Method for Softening Point by Ring-and-Ball Apparatus	No equivalent	No equivalent
12	No equivalent	CSA C22.2 No. 0, General Requirements – Canadian Electrical Code, Part II	No equivalent
13	No equivalent	CSA C22.2 No. 0.4, ~~Bonding and Grounding of Electrical Equipment (Protective Grounding)~~ <u>Bonding of electrical equipment</u>	No equivalent
14	UL 50, Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations	CSA C22.2 No. 14, Industrial Control Equipment	NMX-J-235/1-ANCE, Enclosures for electrical equipment – Part 1 General requirements NMX-J-235/2-ANCE, Enclosures for electrical equipment – Part 2 Specific requirements
15	No equivalent	CSA C22.2 No. 0.12, Wiring Space and Wire Bending Space in Enclosures for Equipment Rated 750 Volts or Less	No equivalent
16	No equivalent	CSA C22.2 No. 0.19, Requirements for Service Entrance Equipment	No equivalent
17	<u>UL 83 Thermoplastic-Insulated Wires and Cables</u>	<u>CSA C22.2 No. 75, Thermoplastic-Insulated Wires and Cables</u>	NMX-J-010-ANCE, Thermoplastic-Insulated Wires and Cables

2. Addition of Requirements for Class CA, CB and G Fuses

RATIONALE

Proposal submitted by: Danish Zia, Underwriters Laboratories LLC

The following is a proposal to add missing requirements Thermoplastic-Insulated Wires and Cables for Class CA, CB and G fuses to UL 98, which presently allows their use.

1. Class G fuses have different physical sizes at 15, 20 and 30 A. UL 98 already has requirements for 30 A. The changes in this proposal include 15 and 20 A ratings.
2. Table 16 and 7.2.8 are revised as Class CA, CB and G fuses have temperature rises within their respective standards that are equal to or greater than the allowable rise for Class T fuses.
3. Based on the LRA of the NEC, the overload tables were revised (for small motors not included in the NEC tables, 430.110 (C)(3) of the NEC requires the LRA to be calculated as 6x FLA).
4. Based on the FLA of the NEC, the endurance tables were revised.

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5. Table 22 is revised to include values for Class CA and CB fuses and correct the number of lines for Class G fuses. While the Class G standard allows different let-through values for the different fuse ratings, only the let-through values for the highest rating within the fuse Class size are necessary within UL 98.

6. Maximum and standard hp ratings in Table 26 for 15 A and 20 A fuses were determined based on 430.52 of the NEC using the following rationale:

a. The “Standard” rating correlates to non-time delay fuses, with a maximum fuse size of 300% FLA for ac and 150% for dc.

b. The “Maximum” rating correlates to time delay fuses, with a maximum fuse size of 175% FLA for ac and 150% for dc.

PROPOSAL

Table 16
Maximum acceptable temperature rises

Material and components	°C
A. Terminals for field-installed conductors:	
1. Unfused switches	50
2. Fused switches for use with 60°C wire and tested with dummy fuses	30
3. Fused switches for use with 75°C wire and tested with dummy fuses ^a	45
4. Class <u>CA, CB, G, and</u> T fused switches rated 100 A or less for use with 60°C wire	50
5. Class <u>CA, CB, G, and</u> T fused switches rated 100 A or less for use with 75°C wire ^a	65
6. Class J (rated more than 200 A), Class T (rated more than 100 A), Class L and Class C fused switches	60
B. All other current-carrying parts:	
1. Unfused switches	50
2. Fused switches for use with 60°C wire and tested with dummy fuses	30
3. Fused switches for use with 75°C wire and tested with dummy fuses ^a	50
4. Class J (rated more than 200 A), Class T, Class L, and Class C fused switches	85
C. Other materials and components:	
1. Wire insulation or insulating tubing	35
2. Electrical tape	55
3. Varnished cloth insulation	60
4. Fiber used as electrical insulation	65
5. Sealing compound	50
6. Phenolic composition used as electrical insulation or as a part whose failure would result in an undesired condition	125
7. Other insulating materials	b
^a Applicable to a connector for copper wire. Also applicable to a connector for aluminum wire or an aluminum-bodied connector, if the connector has a temperature rating of 90°C.	
^b Rated temperature limit of material minus test ambient temperature.	

7.2.10 A switch employing fuse Classes as identified below ~~Class L, T, or C fuses or 400 or 600 A Class J fuses~~ shall be tested with fuses in place and when carrying 80 percent of its rated current continuously:-

a) C, CA, CB, G, L, or T, and

b) Class J rated 400 or 600 A.