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Data Bulletin

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Special Cabling Requirements for 100% Rated Devices Used in Switchboards

Class 2700

INTRODUCTION

Underwriters Laboratories (UL), the National Electrical Manufacturing Association (NEMA) and the National Fire Protection Association (NFPA70) make special consideration for 100% rated devices permitted to operate at higher temperatures than 80% rated devices. Thermal buildup and accelerated insulation deterioration can occur if proper cabling requirements are not met.

The National Electrical Code, Article 310-10 states, “No conductor shall be used in such a manner that its operating temperature exceeds that designated for the type of insulated conductor involved.” The National Electrical Code also states in Article 110-3(b), “Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.” Therefore, installers (such as contractors) of equipment with 100% rated devices must know the special cabling requirements.

UL STANDARDS

UL Standard 891—Switchboards

Due to the higher operating temperatures of 100% rated devices, UL has revised their cable requirements. Following is a summary of the revised Standard for Switchboards, UL 891 Tables 31.1 and 31.2:

A. Circuit breakers that are rated 80% are limited to 50° C rise (cabled) and 55° C (bussed).

B. Circuit breakers that are rated 100% are limited to 60° C rise (cabled) and 65° C (bussed). 90° C cables, sized at 75° C cable ampacity, are required if the terminals exceed 50° C rise.

C. Fused power circuit devices that are rated 100% are limited to 60° C rise (cabled) and 65° C (bussed). 90° C cables, sized at 75° C cable ampacity, are required if the terminals exceed 50° C rise.

D. Miscellaneous switches, 1200 amperes and below, that are rated 80% are limited to 60° C rise (cabled) and 65° C (bussed). This applies to Classes L, T, and J fuses. 90° C cables, sized at 75° C cable ampacity, are required if the terminals exceed 50° C rise.

E. Miscellaneous switches over 1200 amperes are not mentioned as exceptions, so they must be limited to 50° C (cabled) and 65° C (bussed).

The following are two Underwriters Laboratories standards that affect the applications of 100% rated devices:

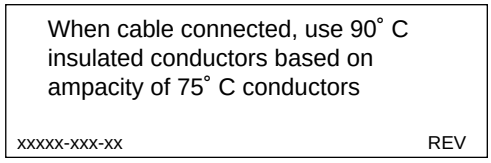
UL Standard 489—Molded Case Circuit Breaker

Paragraph 9.1.2.14

"A circuit breaker that is intended to be operated continuously at 100 percent of its rating and that has a temperature rise on a wiring terminal exceeding 50° C (90° F) ... shall be marked:

A. For use with 90° C (194° F) wire and the wire size. The wire size shall be based on the ampacity of 75° C rated conductor as indicated in Table 6.1.4.2.1.

B. To indicate that wire connectors used shall be identified AL9, CU9AL, or AL9CU, if for use with aluminum or copper-clad aluminum connectors, unless connectors are provided on the circuit breaker."



The label above applies to both 100% rated circuit breakers and bolted pressure switches.

UL Standard 977—Fused Power Circuit Devices

Paragraph 50.7

"If the temperature rise of the terminals ... exceeds 50° C, the fused power circuit device shall be marked that when a cable is connected, 90° C wire shall be employed selecting the size wire based on the ampacity of cables rated 75° C. If the fused power-circuit device is marked for use with aluminum, or copper-clad aluminum conductors, there shall be a marking to indicate that the wire connectors shall be identified AL9, CU9AL or AL9CU.

This requirement applies to both the SQUARE D® BOLT-LOC® Type BP switch and competitors' equivalent fusible devices. Care should be taken, since some 100% devices, such as the BOLT-LOC Type BP fusible switch, require *copper only* cable.

100% RATED CIRCUIT BREAKERS

Listed below are the 100% rated circuit breakers known to us at this time.

SQUARE D

LE, ME, MP, NE, NT, NW, PE, PG-C, PJ-C, PL-C, RG-C, RJ-C, RL-C

Cutler Hammer

DS, SPB, CKD, CHKD, CLD, CHLD, CLCD, CMDL, CHMDL, CND, CHND, CNDC

General Electric

SGHHA, SGLLA, SGPPA, SKHHA, SKLLA, SKPPA, SGHHB, SGLLB, SGPPB, SKHHB, SKLLB, SKPPB, TJH1S, TJH4S, TJH6S, TKH8S, TKH12S, TJL1S, TJL4S, TJL8S, TKL8S, TKL12S, TP, THP

Siemens

RL, RLE, RLF, SBA, SBS, JD6H, HJD6H, CJD6H, LD6H, HLD6H, CLD6H, MD6H, HMD6H, CMD6H, ND6H, HND6H, CND6H, PD6H, HPD6H, CPD6H, SJD6H, SHJD6H, SMD6H, SHMD6H, SND6H, SHND6H, SCJD6H, SCMD6H, SCND6H

BOLTED PRESSURE FUSIBLE SWITCHES

The following is published information on bolted pressure fusible switches.

SQUARE D

All BOLT-LOC Type BP switches will carry 100% of rated current without exceeding 60° C rise over maximum 40° C ambient.

Pringle

“All type QA Switches will carry 100% of rated current without exceeding 60° C rise over maximum 40° C ambient.”

Boltswitch

“With fuses in place, at rated current, in minimum sized ventilated enclosure, terminals shall not exceed 60° C rise over room ambient.”

Since all exceed 50° C, they must be cabled with 90° C cable sized to the 75° C table.

General Electric

When the HPC switch is switchboard mounted, GE suggests using copper cable. Finned heat sinks keep the device’s temperature rise to a minimum, so the use of 75° C copper cable is advised. A contractor could use 90° C insulated cable, but would need to size it to the 75° C tables.

Square D Company
1010 Airpark Center Drive
Nashville, TN 37217 USA
1-888-SquareD (1-888-778-2733)
www.SquareD.com