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## Fuses for Use in DC Control Circuits - Revised

September 14, 2012

The information provided in the Powell Technical Brief #9 regarding the different types and ratings of fuses has changed. This document will address the new types and ratings of fuses and also answer some common questions.

The majority of control circuits in metal- enclosed switchgear, particularly in metal-clad switchgear are supplied from a dc control power source. The most common dc control voltages applied in medium voltage switchgear are 125V and 250V. For the fuse to interrupt safely, Powell thoroughly reviews the fuse performance data to make sure that it meets the requirements in a particular dc control circuit before applying these fuses in the switchgear. The performance data is provided by the fuse manufacturer by designing and testing the fuses per the applicable standards. Most of the fuse manufacturers test their fuses per UL (Underwriters Laboratories) and MSHA (Mine Safety and Health Administration) standards. To select the correct fuse rating for a control circuit, we need to consider the maximum dc voltage withstand, continuous current and fault current interrupting rating.

Powell uses Amp-Trap midget fast-acting ATM type fuses in dc control circuits. These fuses are manufactured by Mersen (formerly Ferraz Shawmut) and are rated up to 600V dc with a maximum fault current interrupting capability of 100kA. However these fuses are used in conjunction with UltraSafe USM type fuse holders. The application of these fuses in this type of circuit has been exceptionally successful and accepted by a wide range of customers.

Following are some common questions about dc fuses

1. What is the dc rating of these fuses?
  - A. These fuses are successfully tested for 100kA interrupting capability at voltage rating of 600V dc. A typical control battery used for switchgear can deliver a short-time current of about 10 times its one-minute discharge rating, so it would be a very unusual dc control circuit that had a short-circuit capability in excess of 100kA.
2. Are these fuses UL listed for dc applications?
  - A. The ATM fuses provided for dc applications are UL listed to standard 248-14 with current ratings up to 30A.

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3. Can ac rated fuse be applied in dc control circuits?
  - A. In general, the ac rated fuses should not be applied in dc control circuits unless the applicable dc ratings are listed by the fuse manufacturer on their data sheet. The fuses we provide are tested for both ac and dc rating and can be applied within the ratings listed in the fuse manufacturer's data sheet.



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