



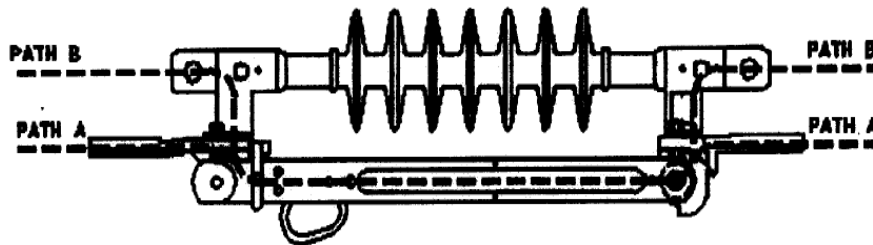
Electrical Distributor Technical Bulletin

In-Line Disconnect Switches

Electrical Distribution Safety

GENERAL STATEMENT:

ESA has been made aware of a 1996, S&C Electric Canada Ltd, Important Product Information bulletin regarding In-Line Disconnect Switches. This bulletin addresses issues with a type of In-Line Disconnect Switch that is still a problem in our industry. This bulletin is meant to ensure LDCs are aware of the problem and provide background information.



TECHNICAL AWARENESS:

With the switch type shown above there are 2 current paths. "Path A" shows the desired current path, through a wedge connector, to the terminal pad, and through the switch blade. If "Path A" develops a high resistance, more current will be forced through the undesired path indicated by "Path B". The current along "Path B" can cause heating issues, leading to end fitting separation.

ESA recommends that crews are made aware of this issue and inspect for any visible signs of cracking. It is important that proper connections are made, including proper cleaning and abrading of the conductor and the use of oxide inhibitor. LDCs could investigate the use of dead-end insulators to increase the impedance of current through "Path B".



ATTACHED INFORMATION:

The Important Product Information bulletin has been attached for LDCs.

ADDITIONAL INFORMATION:

If you can provide additional information on this Bulletin or any other Utility issue, please contact ESA to share your experiences. Additional information requests, including report(s) and follow-up information, may be directed to ESA. Please be prepared to quote Bulletin "DTB-03/06".



December 12, 1996

Important Product Information

In 1983 S&C Electric Canada Ltd. developed an In-line Loadbuster™ Disconnect and an In-line SMD-20 Fuse Mounting. Both of these products were developed at the request of Ontario Hydro, for use on the 27.6 kV distribution system. The product was also expanded to include a 15 kV offering.

The initial design utilized a polymer insulator manufactured by C.K. Composites. This insulator relied on an epoxy “wedge” to secure the end fittings to the insulator body. In 1988, Ontario Hydro reported that four in-line units had suffered end fitting separations, resulting in a downed conductor. In conjunction with C.K. Composites, S&C investigated these incidents, and concluded that a design modification to the end fitting attachment would significantly improve the strength of the joint. These problems were judged to be likely to occur early in the product life, and not likely to deteriorate with time.

In 1986, S&C Electric Canada Ltd. had moved to the use of polymer insulators manufactured by K-Line Insulators Ltd. In 1992, there were two reported cases of end fitting separations of units assembled with the K-Line insulator. In both these cases, it was determined that the customer had improperly terminated the cable jumpers, resulting in an overheating of the end fitting. After this specific problem was addressed, the units have successfully operated at this utility for several years.

Recently, we have had reports of additional incidents of end fitting separations on units incorporating the K-Line insulator. S&C and K-Line are both investigating these incidents to determine the cause(s). In at least two cases, there is clear indication that severe overheating has occurred.

To date, S&C is aware of 7 incidents involving end fitting separations of K-Line insulators (including the aforementioned two), and 6 incidents involving C.K. Composites insulators (including the aforementioned four). This is from a population of approximately 15,000 K-Line units and 3,400 C.K. Composites insulators.

The design of the in-line disconnect results in two parallel current paths (see Figure 1). Under normal circumstances path A has a much lower total resistance, and thus the majority of the current flows through path A. All materials and joints in this path are carefully designed to ensure low resistance, and to meet the applicable ANSI temperature rise requirements. It is believed that in the aforementioned incidents that the jumper terminations were not properly made, resulting in an abnormally high resistance in path A. As a result, path B was forced to carry more current than it was designed for. Overheating of the aluminum insulator end fittings resulted. If sufficient overheating of these components occurs, the aluminum will anneal, which can cause end fitting separation.

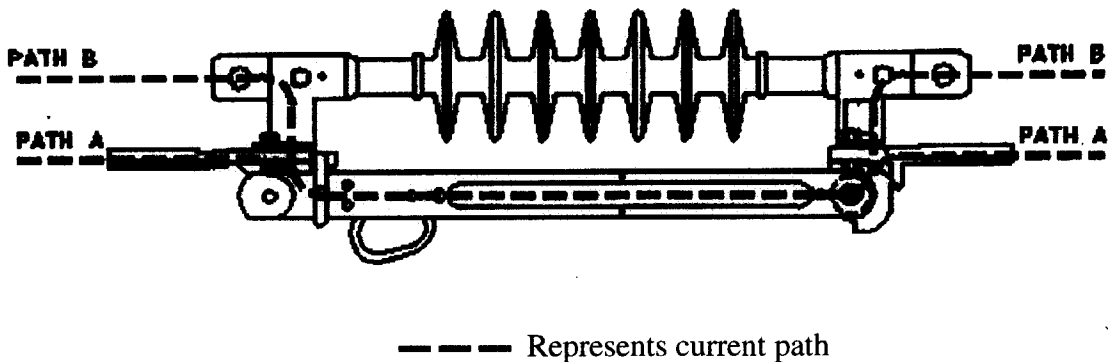


Figure 1. In-line Disconnect shown with parallel current path

It is important that proper terminations be made, including proper cleaning and abrading of the conductor, and the application of a suitable termination compound such as Penetrox. In addition, it is important to insure that aluminum-to-copper connections are properly made. In this case, the optional tin-plated terminal pads should be selected.

Recent testing has proven that the in-line devices will perform reliably if the terminations are correct. Utilities should review their termination practices, and inspect units which they believe might be suspect. A combination of infra-red and visual inspection of the insulator end fittings for cracks or slippage would be the most effective means of verification.

To help make In-line Disconnects and Fuses more immune to this phenomena, all future units will incorporate an insulating material to electrically path A from path B. Please note that if improperly terminated, this does NOT eliminate the risk of end fitting separation due to overheating, but it may reduce it. All new units will incorporate an "R" number revision to their catalogue numbers. Production of these new units will begin December 1996. Additionally, K-Line is conducting on-going research to find methods and materials which will tolerate even higher temperatures prior to damage.

In summary, S&C believes that users need to be aware of this potential problem, and should review their installation practices and take action as required. Clearly, end fitting separation is an important consideration, and therefore, immediate attention would be appropriate.