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Eskom's Experience with SWER (Single Wire Earth Return)

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Abstract

Single Wire Earth Return networks were introduced into Eskom in the 1980's. It was used in arid farming areas where consumption is low (domestic and few other applications such as limited water pumping) and take-off points are very sparse. Lines feeding less than 200kVA typically can be 100km long. Around 1997 SWER design criteria were re-examined and expanded to include network configurations that was suitable for rural village electrification. The standard was also expanded to allow the use of SWER directly coupled to 33kV three phase systems with Neutral Earthing Compensator (NEC) earthing. Currently substantial SWER networks (including directly coupled SWER to 33kV) exist in Eskom.

A few teething problems occurred. This paper discusses some of the issues that had to be dealt with in order to make SWER successful. These included the specification for the insulation transformer, telephone line interference, planning of networks in general and where SWER is to be used etc.

This paper only deals with some of these issues in more detail. Good planning and project engineering is key to the successful application of SWER. The paper deals with harmonic resonance in lightly loaded SWER systems to make designers aware of the issue.