

PURPOSE OF BENTONITE MIX IN CABLE DUCTS

This bulletin provides information on the purpose of inserting bentonite mix into cable pipes or ducts that are particularly installed under road and railway crossings. Failure to fill the air space between the cable and duct will result in increased thermal resistance and if the current rating of the cable is not derated accordingly, overheating and damage to the cable insulation will occur resulting in premature cable failure

In accordance with SANS 10198-2, clause 5.2.2, where a cable route crosses a road or railway, the cable shall be laid in a pipe to facilitate its replacement at a later date without disturbing the road surface or railway track. Pipes or ducts shall be of any material that will not collapse in service. Ferrous pipes can be used for multicore cables but not for individual single-core ac cables.

The disadvantage of installing a cable in a pipe or duct is the air space between the cable and the inner surface of the duct. This air space has relatively poor heat transmission properties and introduces additional thermal resistance that reduces the current rating of the cable within the duct when compared to its direct buried in-ground rating. The in-duct current rating for a particular cable is typically 5-15% less than its in-ground rating, depending on the cable size, the type of duct used and its dimensions.

To eliminate this thermal problem on relatively short duct runs (less than 70m), the air space in the duct should be replaced with a mixture of bentonite, cement, sand and water. The mixture should be pumped into the duct using standard pressure grouting techniques. When sealed within the duct, the mixture remains a gel which can be flushed out using water jets. The grout is sufficiently stiff to provide a constraint against thermo-mechanical movement of the cable. The ducts must be effectively sealed to prevent loss of the filling medium and also to preserve its moisture content under service.

Provided that the moisture content is retained, the thermal resistivity of the bentonite mixture will be less than 1.2K.m/W. The use of bentonite results in an increase in current rating of approximately 10% implying in certain cases negligible de-rating when compared to the direct in-ground current rating.

Failure to apply the bentonite mixture into the duct whilst maintaining the full in-ground current rating of the cable will cause overheating of the cable insulation for the length of cable installed in the duct resulting in premature cable failure. The cable, in such a case, should be de-rated to the lower in-duct current rating for the entire cable route to prevent any overheating in the section that runs in the unfilled duct

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